

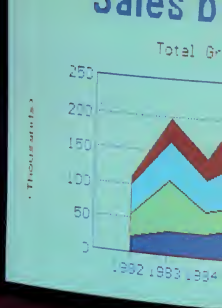
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	Load File (15K cells)	15.9 sec.	19.8 sec.
	Page Down (A1 to A1000)	12.2 sec.	17.4 sec.
GRAPHICS	Presentation-quality Graphics	YES	NO
	Graph Types	10	6
	Integrated Graph Printing	YES	NO
	Full Graph Customization	YES	NO
	On-Screen Font Styles	17	1
	PostScript Support	YES	NO
VERSATILITY	User-modifiable Menus	YES	NO
	Menu Shortcuts	YES	NO
	Pull-down menus	YES	NO
	Point and Press Editing	YES	NO
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VOLUME 7 NUMBER 16

WHAT'S INSIDE

Eighty-eight and counting. We're not talking about the year, we're talking about the number of programs *PC Magazine* editors uncovered when we began planning this month's blockbuster issue on business graphics.

Some were straight charting programs, others were designed for presentations, some were remarkable scientific and analytic tools, mapping mechanisms, draw, paint, animation, and 3-D modeling instruments.

An impressive product roundup—and this list doesn't even count the font and clip-art supplements we also uncovered.

The question: Which, among all those groups, should we focus on? The answer wasn't tough. Within the last year, our readers have kept us busy with queries about presentation graphics. The corporate world wants to tell its story with something more than black-and-white paper copy handouts, and it wants to know the smartest way to do it.

We enlisted a longtime friend and contributing editor, Robin Raskin, to direct our presentation graphics program testing. Raskin's graphics awareness was raised in the early days of computer-generated graphics—when her husband reported to work at a then little-known studio called Lucas Films.

Working with fellow contributor Carol Day and PC Labs project leader Bill O'Brien, she developed a test script that draws out software strengths and weaknesses. She and associate editor Carol Ellison also enlisted the help of the Brilliant Image and MAGICorp service bureaus,



Directing this issue's graphics program testing was longtime *PC Magazine* contributor Robin Raskin.

and in some cases the graphics software companies themselves, to help make slides from our electronic compositions.

You're holding the result. Just days after the presentation graphics reviews rolled onto the press, Ellison joined Ziff-Davis's new publication in Boston, *PC/Computing*, as senior editor.

Ed Perratore, hardworking staff editor, moves to the associate editor's slot. And joining *PC Magazine* with this issue is new senior editor Priscilla Tate-Austin, who we expect will infuse these pages with a decidedly corporate point of view. Tate-Austin comes to us from Manufacturer's Hanover Trust, where she was an assistant vice-president.

With all this going on, we've hardly had a chance to take a break. It's a good thing fitness is the focus of this issue's After Hours section. We review six products that help you tone up, trim down, and keep your cool. After your workout, check out the two games also reviewed: *Willow*, from the movie of the same name, and *Reach for the Stars*, where colonizing distant worlds is your mission.

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COVER STORY



Desktop animation packages such as *Showpartner FX* provide sophisticated cell animation techniques.

More than Meets the Eye: Designing Great Graphics
Bill Howard and Gerard Kunkel Putting words and numbers into accessible and meaningful pictures is no mean feat. Corporate executives are ever challenged to communicate their company's message aggressively with topflight graphics. In this issue, *PC Magazine* examines software and services that can accomplish your presentation graphics tasks92

Desktop Solutions

Presenting reviews of 18
graphics programs suitable for the office *PC*.....109
Business Graphics II.....110
Chart-Master.....111
Decision Graphics.....114
Draw Applause.....116
Freelance Plus.....123

The Gallery Collection129
GEM Graph Presentation Pack.....130
Graph Plus.....136
GraphStation.....140
Harvard Graphics.....143
Image Builder.....147
Lotus Graphwriter II.....150
Microsoft Chart.....155
Nimbus.....156
Picture Perfect.....161
Pixie.....163
SlideWrite Plus.....168
35mm Express.....173
Editor's Choice.....174
Features Table.....176

Studio Solutions

Three high-end graphics programs for a corporate art department, ad agency, or graphics studio185
Impressionist.....186
Kinetic Graphics System.....188
Mirage.....194

Facing the Audience

Dona Z. Mella! Some tips on how to win over the toughest audience with a strong presentation and effective slides203

Adopting a Graphics Family

Robin Raskin! Discover the products and services offered by professional graphics houses.....221
Autographix AutoVisual..222
Graftime.....224
PCchart.....226
Personal Business Slideware.....226
Presenter PC.....232
Slideworks.....234

Making Moving Pictures

Jeff Einstein! Whether it's an in-store marketing display or entertainment, animated effects in presentation graphics leave lasting impressions ..241

Slide Fare for the Common Man

Robin Raskin! Turn to service bureaus for help in making slides and transparencies or for artistic consultation253

EDITORIAL PRODUCT INDEX

A list of products reviewed in this issue, plus a guide to utilities, programs, and tips in the Productivity section ...405

Cover Photograph:

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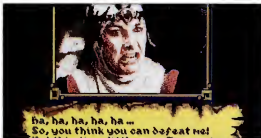
FIRST LOOKS

Hands On:

- IBM DOS 4.0: A Windows-like shell gives an old friend a new look
- Lotus's *Agenda* personal information manager filters order from chaos
- *Office Works* groupware with high-power e-mail, group scheduling
- *Windows/286, 386* add more drivers, more memory for ATs
- *PFS: First Publisher 2.0*
- *Mitsubishi's* affordable 12-MHz laptop
- *AutoManager* takes the frustration out of browsing and managing *AutoCAD* files
- *Extend-A-Name* allows 60-character filenames
- *Perfect Addition: WP* menus, no mouse required. 33

AFTER HOURS

- Racemate and Dynalink make riding a stationary bicycle an exercise in fun
- *Conquering Stress and PC Relax*: Fight stress with a PC
- *Diet Analyzer and Nutrition Wizard*: Calorie counting by computer
- *Willow and Reach for the Stars*: Far-out fantasies 412



The evil Queen Bavmorda mocks those who fall in *Willow's* adventures.

PRODUCTIVITY

UTILITIES

Turning .COM Files into BASIC

Salvatore P. Ricciardi/ *MAKEBAS* converts binary files into BASIC programs. It lets you translate a short binary file (a spreadsheet, chart, or executable program) into ASCII text within a BASIC program. And it's an easy way to prepare files for transmission over a communications system. To recreate the original, just extract and run the BASIC program. 263



ENVIRONMENTS

Presentation Manager Dialog Procedures

Charles Petzold/ Enhancing the simple OS/2 BOXES program illustrates how to display The Presentation Manager dialog boxes and process messages from them. 291

POWER PROGRAMMING

MASM Programming for Quicksort

Ray Duncan/ Implementing the Quicksort routine in assembly language, with an interactive demonstration. 307

SPREADSHEET CLINIC

Douglas Cobb and Steven Cobb/ Easily changing setup strings for a LaserJet; a macro that alerts you when 1-2-3 finishes recalculating. 317

USER-TO-USER

Salvatore P. Ricciardi/ Find a string in multiple sets of files quickly; a utility to send hex codes to any DOS character device driver. 325

POWER USER

Craig L. Stark/ Embedding format commands in *WordPerfect* documents to ensure uniform printouts; creating recursive macros: *Microsoft Word* versus *SuperKey*. 333

LANGUAGES

Robert L. Hummel/ Simple techniques for writing self-modifying programs in Turbo Pascal; a C program that searches for keywords in *Microsoft Word* files. 339

PC TUTOR

Robert L. Hummel/ Assemble and create small .COM files like the ones in *PC Magazine* by using *DEBUG.COM*—one of DOS's most valuable tools. 343

CONNECTIVITY CLINIC

Frank J. Derfler, Jr./ Find the address of the LAN adapter card; batch files can use it to call applications with the correct drivers, or to decide which applications to load. 347

VIEWPOINTS

LETTERS TO

PC MAGAZINE. 15

PC ADVISOR

Joe Desposito/ Backing up your hard disk with a VCR; software for auditing phone lines; scanners that will work with both the PC and the Mac. 27

BILL MACHRONE

Benchmark Bluster. 65

JOHN C. DVORAK

New Age Villainy. 71

Inside Track. 73



JIM SEYMOUR

"Forms" Software: Next Hot Category? 77

STEPHEN MANES

Feelings of Inadequacy: Capitalist Tool. 85

Direct Marketing

Connection. 359
Marketplace. 376
Index to Advertisers. 402
Reader Service Card. 403
Coming Up. 405
Advertisers' Product Index. 406



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Mark Veldt, InfoWorld (Rated #1)

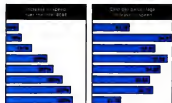
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<input type="checkbox"/> Breakthru 286-12	\$595



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Breakthru 286-8MHz-\$395
Breakthru 286-12MHz-\$595

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products it works in the Compaq Portable and most clones. Easy diagrams show how you just place the card in an open slot, remove the original processor and connect a single cable. There is no software required. From that moment you are running faster than an AT.

Second, they are advanced. The BREAKTHRU 286 replaces the CPU of the PC or XT with an 80286 microprocessor that is faster than the one found in the AT. Has a 80287 math coprocessor slot for numeric intensive applications. A 16K cache memory provides zero-wait-access to the most recently used code and data. Speed switching software allows you to drop back to a lower speed on the fly for timing sensitive applications.

Third, you have full compatibility. All existing system RAM, hardware, and peripheral cards can be used without software modification. Our boards operate with LAN and mainframe communication products and conform to the Expanded Memory Specification (EMS). Software compatibility is virtually universal.

Faster and smarter than an AT - PCSG guarantees it.

Fourth, these are the best. There are several other boards on the speedup market. We at PCSG have compared them all, but there simply is no comparison. Many cards offer only a marginal speedup in spite of their claims and others are just poorly engineered.

We are really excited about these products. PCSG makes the unabashed statement that the BREAKTHRU 286 card represents more advanced technology than boards by Orchid, Quadram, P.C. Technologies, Phoenix...we could go on. Breakthru 286 is undoubtedly the turbo board with the biggest bang for the buck. And we include FREE the \$89.95 acclaimed Lightning software. Call today with your credit card or COD instructions and we will ship your card the very next day.

But, no speedup board cuts disk access time in half

LIGHTNING

software can - \$89.95 or FREE w/Breakthru

"Lightning is almost mandatory..." - Steve Manes, PC Magazine
Best of 86 review

Loads with the DCS - always ready as a background program to accelerate disk access. You do nothing - everything is automatic. Programs that frequently access the disk (hard or floppy) are made instantly up to 2 to 4 times faster. Uses a principle greatly enhanced from mainframe technology called caching. Fully exploits Above Board memory.

LIGHTNING is the standard against which all our competition measures itself because we achieve universal compatibility with other software. Data is never lost. Order LIGHTNING separately or get it free with your Breakthru 286 board.



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DON'T TAKE OUR WORD FOR IT. USE EITHER BREAKTHRU 286 SPEEDUP BOARD FOR 60 DAYS. IF YOU ARE NOT TOTALLY SATISFIED SIMPLY RETURN IT FOR A FULL REFUND.



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Lucid 3-D™ is the best spreadsheet you can buy.

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Winner of
PC Magazine's
1987 Award
for Technical
Excellence

Lucid 3-D is priced to sell at \$199, but we want thousands of people using Lucid everyday, all over the world. We invite you to be a part of that group. The reason we are offering Lucid for only \$149, on a sixty day return for a full refund, is simple. Preliminary user testing of the product produces the same results over and over. People tell us they would never work without Lucid 3-D again. Even folks continuing to work with 1-2-3.

Memory Resident

That's because the idea of a memory resident spreadsheet makes sense, one that you can pop-up instantly while working in your word processor or any other program. Lucid lets you cut anything on the screen and paste it right into Lucid, or cut anything from a Lucid worksheet and paste into the application below. You

can even run Lucid on top of 1-2-3 if you like, and cut and paste information from one to the other, including formulas.

Lucid 3-D was developed over the past two years with countless, exhaustive hours of planning and programming to produce something spectacular. This is a product that works the way we dreamed a spreadsheet would function. Everyone who has seen it says things like, "Lucid 3-D is *how software of the 1990's will look and perform*", or even more to the point "This is the way I thought a computer should work". You'll see, Lucid is exciting.

Masterwork

We could go on at great length about all the features and innovations in Lucid, but Lucid is more than a bag of features. What is most important is the pride and craftsmanship that went into its creation. It is a masterwork. The overall feel is tight and polished. In fact Paul, Somerson, editorial director of PC Computing, used one word to describe it, "Slick".

PCSG has built a reputation as a development laboratory producing products that you know are excellent. In 1983 PCSG dominated the Model 100 laptop market with ROM based software that every reviewer rated as



POP-UP 3 DIMENSIONAL SPREADSHEET

excellent. In 1985 we produced Lightning, the pioneer and award winning Disk speed up software. In 1986 we developed the Breakthru 286 accelerator board that blew everything else out of the water, and later we topped ourselves with the Breakthru 12. Now in 1988 those who have worked with Lucid 3-D tell us "you have done it again. This is software everyone should have."

For a limited time

\$149

Lucid
3-D
1-800-544-4699

Any cell can contain a command that you can access

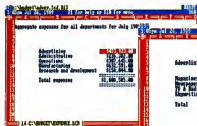


Fig. 1 Let's get the detail on those ad costs. Just move the widerbar to that cell and press one key (Grey +).



Fig. 2 Here we are. Instantly. Notice the lower left corner showing we are on level 2. You can go down or up.



Fig. 3 We want more detail, so let's go to News-papers. Just press the Grey+ key.



Fig. 4 Now, instantly we are on level 3. Each level is a different spreadsheet. You could now move to the New York Times and see the detail on that figure. There is no limit to the levels you can go. Move right down to transaction level if you like.

What Makes Lucid 3-D So Special

In the screen examples you can see Lucid is really three dimensional. Any cell of the spreadsheet can contain a complete other spreadsheet that you can access with a single keystroke. It is as simple as the pictures show. And you don't have to write formulas to do that.

All you do is go look at the other file, navigating through easy, point and shoot directories. When you come back up (with one key) the link is made automatically for you.

Everything about Lucid works that way. Users say "It is so intuitive that I really don't need a manual." That's because we use something we call a visual command menu. Jim Seymour, the noted PC columnist, talking about Lucid in a recent article said that, "If there ever was an interface idea so good it ought to be stolen and widely used, this is it."

What he was talking about is a new menu approach that follows a simple design concept: it is easier to recognize than it is to remember. As choices are made on a menu that take you to lower levels you always can see exactly where you came from and where you are going. The complete menu path is always visible. You cannot get lost several levels down. This means you never have to remember a command, you just flow right to it.

Plus, no matter where you are on a menu or what you are doing, just press function key F1, and you will get a help screen specific to that command or action. Or if you want to know about any subject you can pop up an index of over 600 topics and select the one you want.

Notepad Behind Every Cell

Another 3-D feature is that any cell can also contain a multiple page note that you instantly access with a single keystroke. You can write notes, memos or letters that relate to your work, save them as individual files and even print them separately or with your spreadsheet.

"I've been calling it an 'Everyman's Spreadsheet', and I think that's how the market will position it. It's much more than an inexpensive alternative to 1-2-3."

Jim Seymour, Columnist, PC Magazine, PC Week

Speed

Lucid 3-D™ is truly revolutionary. It is fast, fast, fast! It is incredibly quick in performing calculations because it doesn't recalculate every cell every time you insert an entry. Instead, it only recalculates the specific cells that are affected by your change. This is called minimal recalc. Lucid also has a remarkable innovation called background recalc in which you are given control of the cursor the moment calculations affecting your viewing screen are completed. Other calculations

Lucid Learns

Lucid 3-D™ also lets you teach it in any combinations of keystrokes so that involved sequences can be done with single keys. Plus more than just remembering keystrokes, Lucid allows you to create Macros with loops, procedures and conditional branching amazingly all done automatically with simple menus. You can create your own menus that show the new features you have taught it. Another great feature is you can make your custom menus work like Lucid where one choice can take you

Complete other spreadsheet with a single key.



Fig. 5 Of course, Lucid does multiple windows. Notice, you can simultaneously open windows in different directories, different drives, even down as many 3-D levels as you like. No one else can do that.

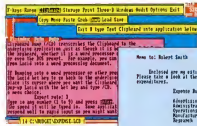


Fig. 6 We need those budget figures in the Word Perfect letter we are writing. Clipboard Dump does it right now.

Fig. 7 (Below) Here it is right in Word Perfect (or any word processor) just like you typed it. You can go the other way just as easily.



down a level to a whole new set of choices. What's nice is that they will work from one spreadsheet to another.

Mouseability

Lucid 3-D™ was designed for both keyboard enthusiasts and mouse lovers alike. You can take your pick. Designed around the mouse from the ground up, the interface is smooth and natural. You select files to load from directory lists. Everything is point and click. What's more, any Lucid 3-D™ menu selection can be "moused" and the response time is "right now" instead of the sluggish "a little bit behind you" feel of add-on mouse menu systems like those you've seen with 1-2-3.

A window pops up with a library of function names you can page through with the mouse. Select, click and it's in the formula with no typing required. You even have a label window that you can fill (from the keyboard) with favorite labels and names so that you can insert them later with the mouse. There's even a pop-up calculator to insert numbers so you don't have to go to the keyboard very often.

It really permits that feeling of becoming one with your work. Lucid 3-D™ has windows of user defined range names as well as the macros named by the user that can be selected just by pointing and clicking. Icons that are

easy to grab with the mouse let you resize and move the spreadsheet window with the ease you would expect. Plus you can go anywhere on the sheet by moving the mouse and clicking on the spreadsheet borders. And remember, Lucid is designed so that any of those features are done with or without the mouse easily and quickly.

Audit

When you are staking a big decision on information gained from a spreadsheet you need to be certain that you have made no mistakes. Lucid 3-D™ offers five audit displays and printouts.

Even if you don't plan to abandon 1-2-3, Lucid makes sense. Files are

converted between them with ease so there's not an interoffice compatibility problem. This means you can have the power and fun of Lucid 3-D™ without having to upset your present systems.

We are excited about Lucid 3-D™. But don't take our word for it, take us up on our 60 day offer.

Call us on our order line number and we will ship your order the very next day. This \$149 offer will end as soon as our dealer network is fully stocked. But in the mean time we invite you to try Lucid as part of our "spread the news" campaign. Just pick up the phone and call us. We accept all major credit cards or you can order COD.

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Database Advisor,
June 1988

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LETTERS TO PC MAGAZINE



386 OR 486?

In the What's Inside column referring to the 80386 cover story ("20-MHz 386s: Hustle with Muscle," *PC Magazine*, June 28, 1988), Winn L. Rosch stated, "There's no reason to delay a 386 purchase."

In the Inside Track column of the same issue, John C. Dvorak discussed the Intel 80486 chip and said, "Get ready to sell everything you own (again) so that you can afford the upgrade. Will this ever end?"

What is the story? Are we to hurry up and purchase an 80386 machine and then, just 6 months later, have to trade up to an 80486? If that is the case, then what is going to happen to the approximately 2 million of us who are still plodding along with our old 8088 processors?

Michael J. Haag
Statesville, North Carolina

PREDICTING NEEDS

I have been disturbed by a trend on several recent *PC Magazine* covers. In the past, when hardware products have been reviewed or featured, *PC Magazine* has always displayed a healthy sense of excitement and interest but has kept its recommendations perfunctory and uninteresting by manufacturers' hype.

The cover of the June 28, 1988, issue stated "There's a 386 in Your Future," while the July 1988 cover proclaimed "VGA: Don't Settle for Less." I sense that the editors may have lost touch with the fact that many users will be quite happy with their 8088s and old-fashioned 10-

MHz 80286s with monochrome monitors for quite some time.

Pai Nims
Point Reyes Station, California

A fast 386 represents the best value for anyone who looks over the horizon. While an 80386 system unit may cost \$1,000 more than a comparable 80286 box, everything else costs virtually the same: hard disk, mouse, software, training, and maintenance. The sum of the parts is the true cost of a PC. Over 5 years that may be \$15,000 versus \$14,000.

The 80386 is the only processor that guarantees the speed and compatibility you'll need over the next 5 years, the life of a typical PC. The 8088 and many 80286 PCs limit your software choices to programs that don't choke on their now-obsolete clock rates. The 80286 suffers limitations (switching between real and protected mode) that the 80386 doesn't. Some next-generation applications may bypass OS/2 for a 386-specific version of OS/2 (possibly called OS/2 2.0 or OS/2-386) so that programs won't have to put up with the 286's quirks. Already a handful of important programs have 80386-specific versions running under DOS extenders.

The 80486 chip (due in 1989) can be considered an even smarter 386. When 486 machines arrive, you may well find their advantages outweigh their price premiums.

VGA cards and monitors offer one-third greater resolution, better speed, and a wider color palette (at some resolutions) for the same price as EGA. VGA is the standard now.

No one expects users to abandon existing hardware for marginally faster equipment. But if you're specifying new hard-

ware, why settle for less and foreclose on your future? Penny wise, pound foolish.
—Bill Howard

FAILURE TO RESTORE

I found several inaccuracies in the review of Everex streaming tape drives ("Hardware Standbys: PS/2 Tape Drives," *PC Magazine*, May 31, 1988).

Everex is well known around the world for the quality and dependability of its tape subsystems. To allow such an article to go to press endangers years of outstanding effort by the engineers at Everex who have worked to produce a cost-effective and reliable tape subsystem.

As examples of fallacies and inaccuracies, I offer the following quotes:

From the Everex Excel II Stream review, "Both file-by-file and image modes are available, with image files allowing only image restoration." From the Everex ST-60 review, "Both file-by-file and image backups are possible, but you cannot restore individual files from an image backup."

Everex Streaming Tape software has always allowed a file-by-file restore to be done from an image backup. To automate the backup routine, Everex provides every buyer with *Scheduler* software. No batch file is necessary. Everex was, in fact, the first to offer an automated backup, and other manufacturers followed in its footsteps.

Helen Goddard
Mississauga, Ontario
Canada



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- 18 GAMES 4—Star Trek, the org Colossal Caves Advent, more.
- 19 GAMES 5—Hack, you and your trusty dog in a wild adventure.
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■ LETTERS

Although not specifically mentioned by name, discussion of the scheduling software was included in the text of my reviews of the Everex tape backup systems. Everex software is indeed able to perform a file-by-file restore from an image backup. We regret the oversight.—Winn L. Rosch

DECODING BAR CODES

At ITS Corp. we have always consulted *PC Magazine* whenever we have had to compare PC products. We were therefore shocked and disappointed this June to read a review of a product of ours that has been obsolete since December ("Reading Between the Lines," *PC Magazine*, June 28, 1988).

Our PC-Wand bar code reader was criticized for the inconvenient setting of the DIP switches to predetermine the code symbology that it would read. The article did not, however, mention my assertion to the author that by the time the article was printed, all of our bar code readers would be auto-discriminate.

Every bar code reader shipped by ITS since January 1, 1988, has auto-discriminate determined the code and read it without setting a DIP switch. The 1987 list price of \$495 was listed, but our current price is \$379. It seems to be a failure in your responsibility to provide timely reports to your readers to print an 8-month-old article on a market segment as hot and expanding as bar coding.

B. Jack Cassidy
Managing Director—CEO
ITS Corp.
Diamond Bar, California

Caroline Halliday refers to the bar code symbology, Code 39 ("Reading Between the Lines," *PC Magazine*, June 28, 1988), as "Interleaved 3 of 9" in several places. In fact, Code 39 (also known as 3 of 9 Code) is not an interleaved bar code.

Each character encoded using Code 39 is composed of 9 elements (5 bars and the 4 spaces separating the bars). By the way, exactly 3 elements in each 9-element character are wide, with the rest being narrow, hence the name 3 of 9 Code.

A common interleaved bar code symbology is Interleaved 2 of 5. In this case, each character is made up of 5 elements (of which exactly 2 are wide). However, in-

stead of mixing bars and spaces within each character, the characters are interleaved. The first character (following the start character) is encoded in the first 5 bars; the second, in the first 5 spaces; the third, in the second 5 bars, and so on.

Some confusion may be due to the fact that the same man, Dr. David Allais of Intermec, who developed Code 39, also proposed interleaving the older 2 of 5 Code symbology.

Steve Offner
Carlsbad, New Mexico

COMPREHENSIVE COVERAGE

As a data processing consultant, I am always in need of intelligent, in-depth reviews of products and trends in our industry. An especially timely example was your LAN feature ("A Field Guide to LAN Operating Systems," *PC Magazine*, June 14, 1988). It was the most informative article I have read on the subject, and it

■ Everex software is indeed able to perform a file-by-file restore from an image backup.

showed an understanding of the technical and business aspects of the subject.

Your product reviews are characterized by an apparent understanding of the real world in which computers are applied, not just a hacker's "gee-whiz" approach. I consider your magazine an integral part of my business, perhaps a crucial part. Keep up the good work.

Richard W. McMullen
Eden Prairie, Minnesota

NEW FACTS

I am writing this letter in regard to the review of our Beyond Fax, Model SPC-1/FX96 communication system ("Getting the Fax," *PC Magazine*, June 28, 1988).

The article gave a fair overview of the then-current state of our board's facsimile abilities but it did not mention the additional non-facsimile-based features that give

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CONVERTIBLE BUS? YOU'RE KIDDING!

No, we're not. In fact, it may well be the most practical microcomputer innovation ever. Say you've selected an AT compatible CompuStar and later want to add PS/2 compatibility. No problem! Snap in a PS/2 Bus and Adapter Module and you can use both buses in the same system. Likewise, if you've selected a PS/2 compatible CompuStar and decide you want to add an AT bus, just snap in an AT Bus Module. Depending on configuration, the CompuStar can have up to 13 bus expansion slots — all AT slots, all PS/2 slots or a "split-bus" of AT and PS/2 slots. Best of all, you can reconfigure your CompuStar whenever you want.

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The CompuStar is also easily expanded. That's because there are seven CompuStar disk/tape compartments — six accessible from the front and an additional full-height bay inside. All this in a sleek, compact tower design that actually leaves more room on your desktop than any of the so-called "desktop" models.

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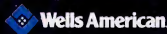
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*Personal Computer AT, AT and PS/2 are trademarks of International Business Machines Corporation. *Photograph depicts optional equipment. Complete price list available upon request. CompuStar 80286 base system (\$1995) includes built-in VGA/EGA display adapter, one diskette drive with controller, two serial/one parallel mouse port, keyboard and 250 watt power supply.

CIRCLE 515 ON READER SERVICE CARD

Why you should care what a Big Eight accounting firm, a \$12 billion bank holding company, PC Week, and Michel Guibord of Orleans, Ontario have to say about **@BASE for 1-2-3.**

You should care because they've discovered a not-so-obvious fact about database add-ins: When you put a real database into 1-2-3 you get capabilities that high-priced stand-alone database managers can't match.

And they discovered that one database add-in stands head-and-shoulders above the rest. @BASE* is superior.

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Coopers & Lybrand, a Big Eight accounting firm, was faced with a challenge. They

*(pronounced "at base")

needed to build a sophisticated tax application that could crunch lots of data and would also be easy to use.

"We started with 1-2-3 because it's very powerful and our clients already know how to use it. We turned to database add-ins for disk-based data storage and discovered that the capability of 1-2-3 is greatly magnified when access to data is unlimited."

C&L took a close look at @BASE before designing it into their application. It performed well in all three areas deemed

Coopers & Lybrand chose @BASE as the engine for this powerful tax application. @BASE is also used in C&L's K-1 Partnership package.



crucial to the success of their project. First, @BASE was very fast in benchmark tests. Second, it was judged excellent for ease-of-use and ease-of-development. Third, it was found to be highly efficient in memory usage. C&L's conclusion: "@BASE is a very good product. It really does the job."

A \$12 billion bank holding company chose @BASE over other database add-ins for use throughout their banking system. Why?

"Our people are 1-2-3 users, not programmers. @BASE blends beautifully with 1-2-3, much better than the other products we looked at. @BASE is smaller and faster and our users pick up on it right away."

They also preferred @BASE for its compatibility with dBASE III Plus. "@BASE lets our 1-2-3 users get at data stored in dBASE files". Some products can import and convert dBASE files but @BASE is the only leading database add-in that reads and writes dBASE files directly.

Rave reviews.

You may not have time to perform your own evaluation. So check the reviews.

"The best of both worlds. @BASE is almost like having dBASE tamed and tailored for your worksheet." — PC World

"By far the most powerful dBASE-related add-in." — Personal Computing

"I could go on and on talking about the power of @BASE. Personics has changed the way 1-2-3 will be used from now on." — PCM

Fan mail.

Many @BASE owners write comments on their registration cards. Here's what some of them had to say:

"@BASE is the best documented and easiest to use database add-in I've seen. Better than others we looked at. Clear, concise, complete."

— Michel Guibord, Orleans, Ontario

"The best database I've ever used. Easy but still very powerful. Love it and thanks!"

— M. L., Fort Worth, TX

"Exactly what I need. Looks like someone has really done their homework."

— J. Y., San Diego, CA

"Used @BASE at the office and I had to have it at home. Great job!"

— A. D., Lake Forest, IL

"Best Lotus add-in I've seen yet. Money well-spent."

— J. P., Chicago, IL

Database Add-In for 1-2-3 Has More Capabilities Than Rivals

The king of the crowded forest of Lotus 1-2-3 database add-ins is unquestionably @BASE...

@BASE was developed by Personics, master of the popular SeeMORE utilities. With @BASE, it's possible to build colonial 32 M byte databases in the standard dBASE III Plus format without ever using dBASE III Plus. Even can convert a normal 1-2-3 database instantly into a dBASE-compatible file, as well as set up dynamic links that will request updated information from dBASE records every time a worksheet is recalculated.

A database can be sorted alphabetically, numerically or chronologically on as many as 128 levels. In fact, @BASE will pick and sort records as much as three times faster than dBASE.

Data can be analyzed to provide lightning-fast reports in response to such queries as: What sales people in each division earned more than \$20,000 in commissions this month?

In addition, records can be entered or examined in a form view, where each record occupies an individual screen. Alternatively, of course, the user can choose the usual one record-to-a-line format.

We tested the current \$195 release of @BASE along with the Option Pac which retails for \$99.95. Together, these two relatively inexpensive products provide truly remarkable functionality.

In addition to the indexing feature, the Option Pac will join files to make relational databases, create computed or derived fields, sort a database without rearranging the records on disk, and automatically keep files in the correct sorting order during record entry or updating.

The 200-page manual for @BASE is excellent. For those who use both dBASE and Lotus 1-2-3, @BASE is practically a requirement. A superior product in every respect.

EXCERPT FROM PC WEEK REVIEW MARCH 8, 1988 USED WITH PERMISSION.

@BASE is the best database add-in and also the smallest. A contradiction? Not really. It was developed by one of the Principal Engineers at Lotus behind 1-2-3 Release 2.

	@BASE \$195	Option [®] \$99.95	Indefinite [®] \$199.95
Ease-of-Use	✓	✓	✓
Ease-of-Development	✓	✓	✓
Performance	✓	✓	✓
dBASE Compatibility	✓	✓	✓
Memory Conservation	✓	✓	✓
Minimum Memory Requirement	70K	174K	250K plus 1MB Extended

Growth path.

@BASE is simple to use, compact and extremely powerful. And if you want to develop relational database applications,

you can get the @BASE Option Pac to add "join" capability and support for multiple indexes. In the future, as new releases of 1-2-3 and dBASE become available, compatible versions of @BASE will follow.

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@BASE works with 1-2-3 Release 2 on the IBM PC, XT, AT, PS/2 and compatibles.

@BASE is from the makers of SeeMORE[™], SmartNotes[™], LOOK&LINK[™] and UltraVision[™].



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The Cure for MacEnvy.



For years PC users have been conditioned to think of their computers in certain terms. Dependable. Versatile. Dull. To get superior graphics, some claimed that you need a different type of computer altogether. They said *their* computer was everything the PC wasn't. Easy to use. Graphically exciting. Fun. PC owners were, well, *green* with MacEnvy.

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■ LETTERS

our board its name: Beyond Fax.

Since the time of the review, many enhancements have been introduced: additional mouse support, easier installation procedures, a rewritten manual, full TSR support, many other printer drivers (including the Hewlett-Packard LaserJet Series II), and direct access of several popular page scanners.

Harold Cork
Sales Coordinator
Microlink Inc.
Burnaby, B.C.
Canada

ONE-TIME ERROR

We were very pleased that Hewlett-Packard's Vectra RS/20 was the first 20-MHz 386-based PC to receive *PC Magazine's* Editor's Choice award ("20-MHz 386s: Hustle with Muscle," *PC Magazine*, June 28, 1988).

However, I would like to clarify one issue. In his review, John Dickinson made reference to problems with the HP microfloppy disk drive reading disks formatted on other systems. This situation was an anomaly caused by a problem with the unit we sent for review. The problem was fixed well before actual shipments of the Vectra RS/20 began, and users of the Vectra RS/20 have experienced no difficulties whatsoever in this area.

William R. Johnson
Group Marketing Manager
Hewlett-Packard Co.
Palo Alto, California

MATCHING MODEMS

PC Magazine's recent review of Telebit Corp.'s TrailBlazer Plus ("Built for Speed: 9,600-bps Modems," *PC Magazine*, April 26, 1988) has left us both puzzled and concerned. Because Telebit designs and manufactures Ven-Tel's Pathfinder 18K modem as well as the TrailBlazer Plus, we find it extremely difficult to understand why the two modems perform so differently in your noise tests. The two units are not merely "licensed cousins," as the reviewer states, but rather identical units with different packaging.

It has been our experience that Telebit modems consistently outperform conventional modems when faced with noise over worse-than-normal telephone lines. Clear-

ly, PC Labs test results for performance over noisy lines do not reflect the capabilities of Telebit's modems.

James F. Jordan
President
Telebit Corp.
Mountain View, California

The PC Labs tests were automated to discount the possibility of human error and were run twice on each unit tested. Results on the second tests confirmed the first. Telebit's TrailBlazer Plus, interestingly, outperformed the Ven-Tel Pathfinder on turnaround time and transmission speed. Differences in firmware may account for the discrepancies or the units tested may have represented opposite extremes on the production standard of deviation.—Ed.

CORRECTIONS/AMPLIFICATIONS

SoftNet Communication Inc. also distributes the ViaNet Networking Operating System ("A Field Guide to LAN Operating Systems," *PC Magazine*, June 14, 1988) and markets it with a LAN adapter card, the KAL 1000/PC.

The \$9,999 configured price of the VIPC 386 Colossus ("20-MHz 386s: Hustle with Muscle," *PC Magazine*, June 28, 1988) includes 11MB RAM.

The Datavorld Data 286 AT compatible ("The Niche Factor: Nine ATs Compete for Market Share," *PC Magazine*, July 1988) was tested with one wait state activated rather than in the optimal zero-wait-state configuration. Without wait states, the machine performs the PC Labs 80286 Instruction Mix benchmark test in 4.56 seconds, the Floating-Point Calculation benchmark test in 18.40 seconds, and the Conventional Memory benchmark test in 0.60 seconds, making it the fastest machine of the nine tested in that review—not fourth fastest, as reported.

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■ JOE DESPOSITO

PC ADVISOR



Using a VCR to back up your hard disk, software that does audit trails, and scanners that operate with both the IBM PC and Apple Macintosh computers.

VCRs—NOT FOR PRIME TIME ONLY
VCRs appear to be a cheap and reliable solution to hard disk backup. One company, Priority One Electronics, advertises a VCR backup product called Videotrax. Has PC Magazine written a review of this product? Also, are any other companies selling similar products? About how long would it take to back up 20MB?

Walter J. Leopold
Belle Chasse, Louisiana

You are right that using a VCR for hard disk backup is cheap and reliable. The Videotrax Adapter Board (Alpha Microsystems, 3501 Sunflower, Santa Ana, CA 92799; (714) 957-8500) that you cite was reviewed in First Looks in the June 10, 1986, issue of PC Magazine. It sells for \$399.

A 90-minute videotape holds about 80MB of data and sells for about \$5—cheap in comparison with streaming tape cartridges that hold 60MB and sell for \$25. Reliability comes from two factors: cyclic redundancy error checking and automatically making multiple backup copies.

The drawback of VCR backup is speed. It takes anywhere from 20 to 30 minutes to back up 20MB of data.

There are some competitors in this arena. Kirsch Technologies (201 N. Riverside Ave., Bldg. A-5, P.O. Box 120, St. Clair, MN 48079; (313) 329-7166) sells the Video Memory Manager for a suggested retail price of \$695. The VMM software is menu driven and can provide a backup function in the background, permitting you full use

of your computer while you are making a backup.

The Imager board from Autofax Corp. (9666 Hwy. 9, Ben Lomond, CA 95005; (408) 336-5171) is less expensive than the previous two systems, and it appears to work just as well. Its suggested retail price is \$295.

One of the nice features of all three products is the ability to do unattended backups. Although your VCR is "off" and in the timer mode, you must leave your computer on (unless you have it hooked to a timing device). Now let's see, what was that great program playing at 2 A.M.?

HAPPY TRAILS TO YOU

I am responsible for several PCs, one of which is connected to phone lines. In order to prevent possible embarrassment to my organization (a 24-hour operation) by bored employees, is it possible to invisibly echo or mirror an audit trail of all micro use

to a hidden subdirectory? I have a large unused portion of a hard disk that can be devoted to this use. Only certain employees would be checked, so this audit trail could be erased each day.

Michael M. Kelly
Oakland, California

Menu generators such as direct access (\$89.95; Delta Technology International Inc., 1621 Westgate Rd., Eau Claire, WI 54703; (715) 832-7575) and Magic Menu (\$89; Deere Soft Inc., P.O. Box 1360, Melbourne, FL; (407) 768-2477) provide a facility for tracking computer use.

The single-user versions of both products were reviewed in the June 10, 1986, issue of PC Magazine. Network versions of the products were recently reviewed in the June 14, 1988, issue (Delta's network version is called Direct Net).

There are also programs that will allow you to capture keystrokes and play them back at a later time. This will give you an audit trail of sorts, although not with the detail (such as date and time) you get from the menu programs.

One such program is Total Recall (\$79; Computer Foundations, 2604 Elmwood Ave., #320, Rochester, NY 14616; (716) 586-9756).

SCANNING ON A MAC AND A PC

As a user of both an Apple Macintosh and an IBM PC, I was wondering if there are any scanners and digitizers available that will work with both computers.

David M. Topper
Houston, Texas

■ Using a VCR for hard disk backup is cheap and reliable. A 90-minute videotape holds about 80MB of data and sells for about \$5.

■ PC ADVISOR

Scanners improve the look of laser-printed documents by providing an easy way to include photographs, line art, or other graphics into a document. Some companies sell scanners that can be used with both an IBM PC and a Macintosh. The trick is in the interface that connects the scanner to the computer.

Hewlett-Packard (call the sales office listed in your local telephone directory's white pages) sells interface kits for its ScanJet scanner. The \$495 Macintosh interface (for the Plus, SE, and II computers) comes with HP's Desk Gallery software, which is designed for use as a Macintosh desk accessory. Interface kits for the IBM PS/2, PC AT, and PC-XT are the same price.

Microtek (16901 S. Western Ave., Gardena, CA 90247; (800) 654-4160) has a line of scanners that work on both the Mac and PC. The purchase price of the scanner includes an interface of choice. An addi-

tional interface will cost you \$295.

Scanners from Dest Corp. (1201 Cadillac Ct., Milpitas, CA 95035; (408) 946-7100) can be hooked to a Mac with a \$120

■ Scanners offer an easy way to include different kinds of graphics in a laser-printed document.

interface, which includes two cables and a terminator box. To hook the scanners to a PC, Dest sells an expansion board for \$245.

Datacopy (1215 Terra Bella Ave., Mountain View, CA 94043; (800) 821-2898) sells a PC or Mac imaging kit for

\$695. This kit includes the interface and software to manipulate the images scanned by the hardware.

Both the Microtek MSF-300C and the Dest PC Scan Plus were winners of the Editor's Choice award in the roundup of scanners that appeared in the October 13, 1987, issue of PC Magazine.

By "digitizer," I suppose you mean a system that has a video camera, frame grabber board, and accompanying software to capture images in real time. The core of the system, which is the frame grabber board and software, is specific to the computer and therefore will not work with both a PC and a Mac. The video camera, though, would work with either computer.

ASK THE ADVISOR

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NOVELL: BTRIEVE, XQL, XTREIVE

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Btrieve is a library of subroutines that allows the programmer to build a database application using any language. It takes complete charge of all file creation, indexing, reading, writing, insertion, deletion, forward and backward searching. Its balanced tree indexing scheme finds any key in a million in less than 4 seconds. That's fast.

Btrieve is a multi-language tool. It includes more than 20 language interfaces (including C, BASIC, PASCAL, FORTRAN). If you've used it before, you are using something a little unusual, worry not. The manual includes a chapter on how to write a language interface to Btrieve.

Btrieve's vital statistics are equally impressive. Files may have up to 24 indexes; fixed record length to 4080 characters; variable length to 84K; indexes to 255 characters; files of 4 billion bytes. Network support includes Novell, 3-COM, IBM PC NET, Software Link's Multitask and many others.

XQL is a relational database management system designed especially for programmers. Imagine being able to access your database with the ease of SQL (Structured Query Language) statements and still having the power to process that data right down to the byte level.

Think about your applications. A large part of your software development effort is probably devoted to managing data stored in files on disk. Hours spent writing lines of code to search and store data

records could have been used to program more important parts of your application. Why not let XQL do it for you. XQL will increase your programming productivity and let you focus on building better applications.

The XQL system works in tandem with Btrieve and has an equally powerful schema. No limit on the number of records per file. Max. file size is 4 gigabytes. Max. record size equals 4K. Max. indexes per file is 24. The one version works for single or multiuser systems, DOS Ver 3.0 or greater. All languages are supported.

Xtrieve is the final ingredient in the Novell programming recipe. It is a menu driven, data retrieval system, that allows you to quickly find information and display reports. System developers can easily customize Xtrieve to display custom menus, help files, and error messages in the English spoken by the customer. Xtrieve screens then gives menu choices that users can quickly recognize, making Xtrieve an easy product to use and understand.

Report Options for printing customized reports, form letters, mailing labels and statements.

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FIRST LOOKS

OS Who? IBM DOS 4.0 Brags New Look, Long-Awaited Features

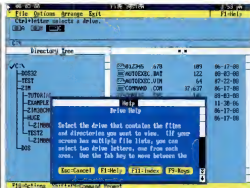
PC HANDS ON

BY PAUL SOMERSON

Unless you own a software company that sells a DOS shell, you'll really like what the programming wizards at IBM have done to Version 4.0 of DOS. Honest.

DOS 4.0 answers just about every major complaint about prior versions. Most users are fairly cavalier about operating system upgrades. This one they'll want. Of course, if you look closely, you'll see the IBM seams.

For most users the best news is that IBM has provided a



DOS 4.0 File System screen showing help window. The window on the right shows the files in the current subdirectory, marked by a check in the left window.

smart, attractive, powerful shell that takes the sting out of directory and file management.

Based on IBM's SAA standard, the shell is actually a welter of resident, transient, help, and configuration files that you invoke from a batch file called DOSSHELL.BAT. You can run the shell in text or graphics mode, and in resident or transient mode.

The File System lets you work with one or two drives or directories at once, and can display both the disk structure and appropriate file information for each. You may view (in ASCII or hexadecimal), copy, sort, de-

(continues on page 35)

\$395 Lotus Agenda: The 1-2-3 of Personal Information Managers?

PC HANDS ON

BY BILL HOWARD

Personal information manager is the mouthful of a term coined by Lotus Development Corp. to describe software that helps you organize your ideas. If you're the type of person who scribbles notes on the backs of business cards, clips newspaper and magazine articles for inspiration, and keeps a notebook in your pocket just in case, you'll love *Agenda*—Lotus's \$395 electronic notebook, people and project tracker, to-do list, and decision-making assistant.

Agenda stores, sorts, and categorizes information. So do databases, outliners, list man-

agers, and text-retrieval software, and *Agenda* bears passing resemblance to each. But *Agenda* lets you enter or import information and structure it as you go along, then look at it from different angles.

After loading *Agenda* and creating a file, you simply start typing in information. You can enter two or three sentences (up to 350 characters) per item—Lotus's term for one segment of free-form text. You can also attach notes as large as 10K to each item. An *Agenda* database can comprise 4MB of items and notes.

Once you have an idea of where you're headed with your information, you add structure by creating *categories* and

views. Categories are roughly analogous to fields in a traditional database—name, date, address, who-to-contact, true/false—and views are like on-screen reports. One big difference: in a database, you have to type the data in the proper fields; in *Agenda*, the fields can fill themselves in, based on what you've told *Agenda* about how to match and sort.

Imagine a file that includes random notes on your staff and customers. A typical item might read: *Bumstead Industries wants to do final negotiations with our marketing director at the beginning of October.* Based on your category definitions, *Agenda* knows to link

(continues on page 34)

HANDS-ON INDEX

OFFICE WORKS

The latest LAN-based group productivity tool..... **36**

WINDOWS/286, 386

Upgrades bring LIM 4.0 support and more usable memory to ATs..... **38**

PFS: FIRST PUBLISHER

Version 2.0 supports both word processor and scanner files..... **43**

MITSUBISHI MP286L

12-MHz laptop boasts dazzling display, plenty of ports..... **46**

AUTOMANAGER

The easy way to browse through your AutoCAD files..... **48**

MICROSOFT COBOL 3.0

Faster code, more dialects, new debugger..... **54**

File Edit View Window Help

New Initial View

Item	When	Priority
► performance review due Friday	10/26/88	High
► in Seattle end of Sept. on Quinley contract	10/26/88	Medium
► asked about vacation end of November	11/30/88	Low
► wants to pitch Murray account	10/26/88	Medium
► Burnstead Industries wants to do final negotiations beginning of October	10/01/88	High
► Should Harry work with our current people on Burnstead account? Decide by 9:25:00	09/25/88	Medium

Initial View

Random items as entered into Agenda. Agenda generates the dates in the When column automatically from days mentioned in each item. Priorities were assigned manually.



Agenda: Order from Chaos

Agenda's logical structure consists of items, categories, and views. You enter each item, or record of information, into Agenda randomly. You then define categories and list their members and any applicable aliases. Agenda builds various views of the items by searching each item for members of categories. Above, an initial View is broken into subsequent views by Salesmen and Priority categories.

File Edit View Window Help

New Salesmen

Item	Customer	Priority	When
► performance review due Friday	Quinley	High	10/26/88
► Tom wants to pitch Murray account	Murray	Medium	
► Burnstead Industries wants to do final negotiations with our marketing director beginning of October	Burnstead	High	10/01/88
► Dick in Seattle end of Sept. on Quinley contract	Quinley	Medium	09/30/88
► Should Harry work with our current people on Burnstead account? Decide by 9:25:00	Burnstead	Medium	09/25/88

File Edit View Window Help

New Priority

Item	When
► Burnstead Industries wants to do final negotiations with our marketing director beginning of October	10/01/88
► performance review due Friday	09/26/88
► Should Harry work with our current people on Burnstead account? Decide by 9:25:00	09/25/88
► Tom wants to pitch Murray account	09/30/88
► Dick in Seattle end of Sept. on Quinley contract	09/30/88
► Harry asked about vacation end of November	11/30/88

Salesmen View

Items viewed by Salesmen category. Customer and Priority columns are also displayed.

Agenda allows alias definitions and automatic linking. Tom has been given the alias "TJ," and Dick "marketing director." Dick has also been linked internally to the Burnstead account.

Priority View

Items viewed by Priority category.

Agenda

(continued from page 33)

"Burnstead Industries" to the customer category. You also defined Dick's title—marketing director—as one of Dick's aliases, so Agenda links the item to Dick as well. Agenda can parse most conversational dates into actual calendar dates, so "beginning of October" is automatically assigned the date 10/1/88. Finally, you told Agenda "Burnstead" (your most important client) is to be automatically pushed into the High Priority category.

You can have several columns of information on screen. One column always contains the items. Other columns might show dates, topics, names of contacts, priorities, or phone

numbers. Columns are simply categories that aren't the subject of the current view.

Defining categories takes time, so you benefit most from compiling and massaging non-trivial amounts and types of data. For small files, you can manually assign the information to categories. You can type in information by hand or import external files, which makes Agenda at least a distant cousin to text-retrieval programs.

Lotus has a stiff challenge ahead, especially since you've gotten along without Agenda so far. Lotus has a missionary task explaining personal information managers in general and Agenda in particular.

Will Lotus succeed? Agenda is a brilliant concept. It may be the most original and powerful piece of software we'll see in

1988. However, Agenda is not without its problems:

● Agenda isn't particularly easy to learn.

● Agenda can schedule by date but not by time, limiting an obvious use as an appointment scheduler.

● The printing features are nondescript. No contemporary Microsoft product would ever go out the door with such rudimentary printer controls.

● Agenda is a memory pig. It needs 512K, and 640K is strongly recommended. (Expanded memory? What's that?)

If you're willing to live with these quirks and to invest in an intensive learning period, you'll be rewarded with what could become the single most important piece of software you own. There are PCs on 20 million desks in America today. Agen-

da has the potential to be the tool that conquers the next 20 million.



FACT FILE

Agenda

Lotus Development Corp.
355 Cambridge Pkwy.
Cambridge, MA 02142
(617) 577-8500
List Price: \$395

Requires: 512K RAM, hard disk drive, DOS 2.0 or later.
In Short: A brilliantly conceived tool for recording, analyzing, and categorizing free-form information. Not copy protected.

CIRCLE 446 ON READER SERVICE CARD

Office Works Integrates Message Control, E-mail, Group Scheduling

PC HANDS ON

BY FRANK J. DERFLER, JR.

Office Works, a new bundle of software from Data Access Corp., is the latest of a growing breed of software—groupware. The \$195 standalone version of *Office Works* gives you little more than a personal calendar, telephone directory, and file index. But the \$1,395 LAN version adds e-mail and group scheduling features that can help any organization communicate and function more smoothly.

Office Works uses the NetBIOS services of a LAN operat-

ing system to move messages and files between stations. Since every vendor doesn't implement NetBIOS the same way, you should be sure that *Office Works* is compatible with the hardware/NetBIOS combination you use. In networks running under Novell's *NerWare*, *Office Works* uses Novell's IPX protocol to communicate between stations instead of using NetBIOS, but the effect and performance are the same.

The classic groupware product is electronic mail, and a good e-mail system is the heart of *Office Works*. This store-and-forward e-mail program lets you easily reply to and forward mes-

sages. You can create distribution lists with both direct addressees and cc: ones, and even attach binary files to messages.

A unique and very useful capability of *Office Works* is its e-mail interface to PC fax cards. If a network node has an Asher JT-Fax card installed, the e-mail system can route ASCII files to that node and then translate them into a format for fax transmission. The fax transmission is initiated in the normal manner, but *Office Works* handles the task of loading the files, properly formatted, onto the fax system's hard disk.

Another nice feature, the *Office Works* Telephone Function, replaces the pink-paper-message slip. All users can take telephone messages and send them to anyone on the network.

The Telephone Function screen includes the check-off boxes found on the paper forms, such as "please call" and "returned your call." But, in a handy feature that message pads can't touch, the Telephone Function can automatically dial the callback number through a Hayes-compatible modem.

To keep track of the myriad of files any organization accumulates, *Office Works* provides a formidable document-control function. You can index program and data files according to a name, date, subject, author, keyword field, and other factors. You can also perform wildcard searches, print out reports, and even find and run specific .COM or .EXE files.

Another category of workgroup software does group scheduling or calendaring. This kind of program lets you find the best time for a meeting or activity by comparing the free time of the people, facilities, and equipment you need.

The *Office Works* screens make it easy to enter all the data needed to schedule a meeting. The program tells you if a person or resource has a conflict at the time you scheduled. If there

is a better time within the span you specify as acceptable, the program clearly shows it by putting the date and time in a box and highlighting it on a graph. When you schedule a meeting, the system generates e-mail messages notifying the participants.

Office Works takes a lot of space on the server's hard disk drive and up to half the available memory on a 640K workstation. The files for the program take over 2.5MB on the server before you start storing messages and calendars. When you run *Office Works* on a workstation, the software takes slightly over 300K RAM.

The designers at Data Access gave *Office Works* many features aimed at making it easy to use. The package includes good help screens, keyboard templates, and stick-on-keytop labels. The selection of keystrokes is consistent between the different functional programs in the package.

Office Works is a major entry in the small and young workgroup software market. It is an effective competitor with products like *Higgins* as a workgroup productivity tool. If your group is ready to "live on the LAN," *Office Works* can add value to your networking activities.

Getting a Handle On Groupware

"Groupware" is a popular term for software, usually running on a LAN, that increases group productivity the same way that software running on a single PC increases individual productivity. Groupware includes a broad category of products, but increasing group productivity through communications is the common thread.

One valuable area of groupware is group scheduling, or calendaring. You can ask a secretary to make a minimum of seven phone calls to find a time to gather five busy executives in a conference room, or you can use a calendaring program. One of these programs will do the task with just a few keystrokes and notify each attendee of the meeting through electronic mail. *Higgins*, from Conetic Systems, and *Shoobox 3*, from R+R Associates, are two proven scheduling programs.

Another category of groupware helps people draft, circulate, edit, and dispatch correspondence. These document processing programs protect the original text while people make comments and suggest changes. They show the source of each

proposed change and build a chain of related comments, often using split-screen or multi-color text. *ForComment*, from Broderbund Software, is one of the most popular correspondence handling packages.

A third category of groupware products simply makes important organizational information available to everyone. These are databases with a pretty face that are the electronic analog of organizational phone books, file plans, and desk calendars.

An emerging area of groupware deals with project management and tracking. These programs don't have all the features of top-notch, single-user project managers, but they track group projects and activities and remind people when work is due. *The Coordinator*, from Action Technologies, pioneered this kind of product. *Action Tracker Plus*, a new program from Information Research Corp., promises to help allocate time and resources and plan actions according to schedule, time, budget, goals, and other criteria you describe.

—Frank J. Derfler, Jr.

PC FACT FILE

Office Works

Data Access Corp.
1400 SW 119 Ave.
Miami, FL 33186
(305) 238-0012

List Price: Single-user version, \$195; LAN version, \$1,395.
Requires: 640K RAM, 2.5MB hard disk storage. Compatible with Novell's *Advanced NetWare 2.0* and other NetBIOS-compatible networks.
In Short: LAN version offers e-mail, group scheduling, and other workgroup computing features that help organizations function more effectively. Not copy protected.

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Windows/286, /386: More Usable Memory, More Printer Drivers, Improved Installation

PC HANDS ON

BY JOHN DICKINSON

If you aren't a *Windows* fanatic, Microsoft is disappointed, but the company hasn't given up on you just yet. To prove it, Bill Gates and company have introduced two new versions. *Microsoft Windows/286*, Version 2.10, is a reshuffle of *Windows* 2.03, with a few neat additions. *Microsoft Windows/386*, Version 2.10, is a similarly spruced-up rendering of the 80386 version.

One clarification is due up front: *Windows/286* will run on 8088- and 8086-based PCs. The name change is purely cosmetic, an admission of sorts that the *Windows* environment is too demanding for anything less than an AT-class machine.

The most intriguing aspect of *Windows/286* is its use of an

additional 64K of 286 extended memory in real mode. That means your 640K magically becomes 704K when *Windows* is running. Since the basic *Windows* kernel has grown slightly, the Microsoft executive reported that free memory had grown by 43K from *Windows* 2.03. *Windows/286* requires a device driver, HIMEM.SYS, to use the additional memory.

There is a downside to the new feature: the reputation *Windows* has for memory conflicts will probably get worse. In my case, it did. Multisoft's *PC-Kwik* crashed into HIMEM.SYS and caused *Windows* to lock up. On the other hand, *Windows/286* knows how to use LIM 4.0 boards to store and swap executable code. Older versions didn't even know how to use LIM EMS 3.0.

Both new versions ship only on 1.2MB 5¼-inch or 720K

3½-inch floppy disks, neither of which most 8088-based PCs support. However, you can obtain a copy on 360K 5¼-inch disks by calling Microsoft's technical support once you've bought the package.

The new versions also come with a supposedly more intelligent SETUP program to make installation easier. When I installed *Windows/386* on a Hewlett-Packard RS/20, all went well; *Windows/386* detected the type of machine and its peripherals, including a custom mouse. But *Windows/286* wasn't so smart.

First of all, the installation program refused to recognize any of the virtual drives that occupy the HP's 103MB disk. Then, the installation menu gave me the choice of an AT-compatible and a few other machines that didn't include the HP. It gave me the choice of Microsoft, Logitech, and a couple of other mouse drivers that didn't include the HP mouse. All efforts to install an alien mouse failed. As a result, there is now both a Microsoft mouse and an HP mouse installed on the RS/20.

On the bright side, the *Windows* SETUP program can now modify your CONFIG.SYS file to load HIMEM.SYS and SMARTDRIVE.SYS, and it can even modify your AUTOEXEC.BAT file to include *Windows* in the path. But overall, the SETUP program lacks the sort of friendliness found in the rest of *Windows*. It still insists on making a separate directory for .PIF files and loads all 39 of them—whether you want them or not.

Both versions of *Windows* support more devices than previous versions, but there are some curious missing links and a few oddities. For instance, Microsoft has included support for the IBM 8514 adapter and display, the Wyse 700, and the Genius displays in *Windows/286*, but these devices



FACT FILE

Microsoft Windows/286, Version 2.10

Microsoft Windows/386, Version 2.10

Microsoft Corp.
1601 N.E. 36th Way

Box 97017
Redmond, WA 98073
(206) 882-8080

List Price: *Microsoft Windows/286*, \$99; *Microsoft Windows/386*, \$195; free upgrades to those who purchased Version 2.03 of either package after June 1, 1988; \$25 upgrade for other users.

Requires: *Microsoft Windows/286*: 512K RAM, hard disk; 80286-based PC and mouse recommended. *Microsoft Windows/386*: 2MB RAM, hard disk, 80386-based PC; mouse recommended.

In Short: An evolutionary rather than a revolutionary upgrade, with improvements mainly to the internal operation of *Windows*. Not copy protected.

CIRCLE 63 ON READER SERVICE CARD

Windows/286 Memory Map

1024K—1088K (FFFF0—10FFEF hex)	HIMEM.SYS-defined extra 64K memory
1024K (FFFF0 hex)	HIMEM.SYS-defined segment registers
768K—1024K (C0000—FFFF0 hex)	Memory area for BIOS and BASIC ROM and expansion ROM
704K—768K (B0000—BFFFF hex)	Monochrome, CGA, EGA, VGA, and PGA video memory
640K—704K RAM (A0000—AFFFF hex)	EGA and VGA video memory
0—640K (0—A0000 hex)	User RAM for DOS, device drivers, resident programs, and application programs

aren't supported in *Windows/386*.

Other changes are nearly transparent to users and the claimed performance improvements aren't really obvious until you do something like reformat a whole window.

Printer support has been improved. More than 100 are now supported, and downloadable fonts are available for LaserJet printers.

None of the enhancements to *Windows/286* or *Windows/386* is big news in itself, but, taken as a whole, the enhancements improve *Windows* notably. If you use *Windows* now, you'll find the upgrade worth the trouble. If you've held out this long, it may be time to give *Windows* a try.

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*Time Line 2.0, PC Magazine Editor's Choice 1986 & 1987; rated #1 by Software Digest 1987. Time Line 2.0 (\$495) is the best choice for laptops or PCs without hard disks or with <640K RAM. Time Line 2.0 owners call (415) 964-4440 for low-cost upgrade. Training and consulting services available. call (415) 898-1509. †Task Task, the original outline processor from the Living Videotext Division. © 1988 Symantec, 10250 Torrey Ave., Cupertino, CA, (408) 253-5600.

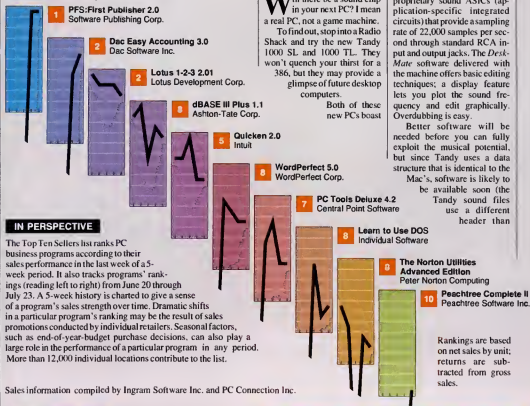
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PIPELINE

TOP TEN SELLERS

(A 5-week history)



IN PERSPECTIVE

The Top Ten Sellers list ranks PC business programs according to their sales performance in the last week of a 5-week period. It also tracks programs' rankings (reading left to right) from June 20 through July 23. A 5-week history is charted to give a sense of a program's sales strength over time. Dramatic shifts in a particular program's ranking may be the result of sales promotions conducted by individual retailers. Seasonal factors, such as end-of-year-budget purchase decisions, can also play a large role in the performance of a particular program in any period. More than 12,000 individual locations contribute to the list.

Sales information compiled by Ingram Software Inc. and PC Connection Inc.

Will there be a sound chip in your next PC? I mean a real PC, not a game machine.

To find out, stop into a Radio Shack and try the new Tandy 1000 SL and 1000 TL. They won't quench your thirst for a 386, but they may provide a glimpse of future desktop computers.

Both of these new PCs boast

proprietary sound ASICs (application-specific integrated circuits) that provide a sampling rate of 22,000 samples per second through standard RCA input and output jacks. The *DeskMate* software delivered with the machine offers basic editing techniques; a display feature lets you plot the sound frequency and edit graphically. Overdubbing is easy.

Better software will be needed before you can fully exploit the musical potential, but since Tandy uses a data structure that is identical to the Mac's, software is likely to be available soon (the Tandy sound files use a different header than

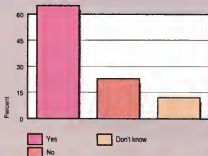
Rankings are based on net sales by unit; returns are subtracted from gross sales.



SURVEY

The RAM shortage has been on every PC buyer's mind lately. In a poll of callers to PC MagNet, we found that the price crunch is holding back purchases. More than half of the respondents said that they'd delayed purchase of a memory upgrade or new system.

Have you paid more for PC equipment because of the RAM price hike?



the Mac's, so a conversion utility will be needed before *DeskMate* will be able to read Mac music).

Neither machine is equipped with enough horsepower to break into corporate enclaves: the SL runs an 8-MHz 8086, and the TL runs a 286 at 8 MHz. But they're aggressively priced (at \$889 and \$1,299, respectively, without monitors) and will probably be popular with schools.

CDs Blossoming Under High Sierra Standards

A couple of new releases on CD should put to rest lingering confusion over whether compact disks have reached a standard for data structures. Micro-soft and Ziff Communications (publisher of *PC Magazine*) will soon publish reference works in the High Sierra format. And Hewlett-Packard just announced *LaserRetrieve*, a Windows-based CD search engine that reads High Sierra and TIFF data structures.

Microsoft's *Programmer's Library* is a collection of tech reference manuals on CD, using the same memory-resident software in *Microsoft Bookshelf*.

Ziff Communications' *Computer Library* is a collec-

tion of more than 43,000 abstracts and 19,000 articles from computer-related publications; *PC Magazine*, *PC Week*, and *MacUser* are represented in full. The abstracts are culled from more

hardware heavyweights to wrest control of Unix away from AT&T. It bore its first fruit in August. DEC announced that it will give away the user-interface portion of its own X Windows implementation, called

allow windowing into DOS programs running under Unix System IV or V on a network.

DEC said they made the move to comply with OSF's "call for technology," an appeal that was made the group's quest to find a bulletproof, industrywide standard. DEC is hoping its contribution comes early enough in the process to make an impact on the course of OSF's work.

From the other side of the fence, Sun Microsystems and AT&T submitted their spec for Open Look to OSF. That same spec was also passed around to favored software publishers, in the hope of finding and correcting disputes before the final spec is published later this year.

Unix unification is a goal fervently sought by PC managers who need multiuser support but are forced to choose among incompatible Unix versions. Few software publishers have the resources to support all Unix platforms they're being asked to. Unfortunately, unless hardware makers put their competitive drive into neutral and endorse their competitor's standards, Unix seems destined for a balkanization, rather than a unification.

—Gus Venditto

A couple of new releases on CD should put to rest lingering confusion over whether compact disks have reached a standard for data structures

than 100 publications, including *UNIX World*, *MIS Week*, and *Datamation*. The CDs will be available on a yearly subscription basis. (This same database will soon be available on-line through PC MagNet.)

Any CD player that comes with MS-DOS extensions will run these disks, or any of the financial databases in Lotus's One Source line.

On the Road to Unix Unification

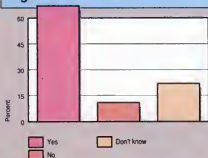
The Open Software Foundation (OSF) was recently founded by IBM, DEC, Hewlett-Packard, and several other

DEC windows, to interested programmers. DEC will charge only for copying disks and manuals and will ask nothing for the software license. The tool kits include C libraries for control of basic screen, menuing, and file-management functions; a window manager; and a style guide.

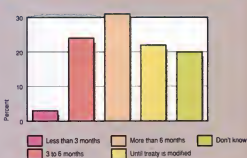
DEC said more than 100 software developers are already at work on applications, including Interleaf, MathSoft, and Relational Technologies. The first products are likely to be out in spring of 1989.

Of course, DEC windows programs will run under DEC VMS and ULTRIX; they'll also

Do you think the current shortage is the result of the U.S.-Japan Trade Agreement of 1986?



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person runs a report. Or, forty people want to work on the expense database. All at once. Impossible?

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*Q&A 3.0 single user \$349 (supports full record locking of databases shared on a LAN). Optional Q&A Network Pack (\$299 when added to Q&A 3.0 on a LAN) allows three additional users to simultaneously operate Q&A. Add additional Q&A Network Packs for more simultaneous users. Q&A Software Distributors' #1 file manager 85,85. InfoWorld's highest rating ever given (9/8/85). PC Magazine Editor's Choice 87,88. © 1985 Symantec, 10201 Torre Avenue, Cupertino, CA 95014 (408) 253-9600. **Buy Q&A between 1/1/88 and 10/31/88, get the 100,000 synonym Microfinks Thesis FREE. See coupon on Q&A package for complete details.

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Q&A

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First Publisher Adds Speed, File Import

PC HANDS ON

BY DEAN HANNOTTE

PFS:First Publisher is one of those rare items: a tool that fits the hand. It isn't *Ventura Publisher* or *PageMaker*, but it doesn't pretend to be.

PFS:First Publisher simulates the famous Mac look. Graphics are even kept in .MAC files, which are in *MacPaint* 1.5 format.

Version 2.0 runs fast, much faster than its predecessor and undoubtedly faster than it could run under *Windows*.

Once in a document, you toggle between text mode and graphics mode. In text mode, you enter or import text in up to four columns and then assign type fonts, sizes, and styles. You can center, left-align, right-align, and justify individual lines or line groups.

The package imports text from **PFS:First Choice**, **PFS:Write**, **PFS:Professional Writer**, **Microsoft Word 3.0**, **MultiMate**, **Wang PC**, **WordPerfect** (Versions 3, 4.1, and 4.2), and **WordStar**, but you can export only in ASCII format.

In graphics mode, you draw your own pictures by using tools similar to *PC Paintbrush's* or load any of the 150 clip-art images that come with the product.

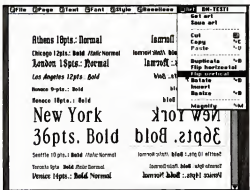
You can also easily import graphics from *PC PaintPlus*, *PC Paintbrush*, *Microsoft Windows Paint*, *Lapigaint*, and *Publisher's Paintbrush*. The package accepts images scanned at 72 dots per inch.

You can even convert text to graphics format and then duplicate, flip, rotate, invert, and resize it. You can also magnify a portion of the graphics page and indulge in "fat-bit" editing, a feature both *PageMaker* and *Ventura* lack.

The program comes with several medium-resolution graphics fonts, which are "smoothed" at print-time, as

well as built-in pica and elite. Over 50 dot matrix printers are explicitly supported, and the program supports soft fonts and selected cartridge fonts for the HP LaserJet and DeskJet and Apple's LaserWriter. There is also a separate file of decorative Mac-derived graphics fonts.

Some work can still be done to make **PFS:First Publisher** cleaner. It should remember your most recent settings in more contexts, and *PgDn* should be used to go to the next page instead of *Shift-Plus*. The **SNAPSHOT** program that lets you capture *AutoCAD*, *Lotus Graphics*, and *Harvard Graph-*



The set of function key icons that appear next to the various menu selections increase **PFS:First Publisher 2.0's** ease of use.

PC FACT FILE

PFS:First Publisher, Version 2.0

Software Publishing Corp.

1901 Landings Dr.

P.O. Box 7210

Mountain View, CA 94039-

9910

(415) 962-8910

List Price: \$129; clip-art portfolios, \$39 each.

Requires: 512K RAM; EGA, CGA, or Hercules display; two disk drives; mouse recommended; DOS 2.0 or later.

In Short: Simple but elegant desktop publishing package.

CIRCLE 452 ON READER SERVICE CARD

ics images shouldn't make you "develop" each picture by running it through a second program before you can snap another.

Bear in mind that **PFS:First Publisher** is not up to the highest corporate publishing requirements. For instance, you can't draw frames in which to pour text, and your layout won't benefit from style sheets or paragraph tags. You can download soft fonts, but you won't see their screen analogs. There isn't even text autoflow from one page to the next.

Readability Analyzes Your Writing Style

PC HANDS ON

BY JENNIFER ZAINO

Scandinavian PC Systems' **Readability** program is a different kind of style checker. The \$59.95 program doesn't help you with your grammar or spelling, but it does offer a graphics- and percentage-based analysis of your writing style.

The ability to analyze your text's suitability for its intended purpose is the most intriguing aspect of the program. You can compare your text with nine model-analysis patterns. These range from an "ideal" writing

style to those appropriate for newspaper articles, novels, and young people's books. You can even find out if your writing comes perilously close to bureaucratic gobbledegook.

Based on your selection, the program creates a style diagram of your sentences so you can identify which are complicated, wordy, or pompous. The program also displays the percentage of sentences that fit each of the nine analysis choices.

One of the most useful graphs lets you pinpoint strings of long sentences. Another helpful graph identifies when you have overloaded a single

sentence with too many long words.

Readability also breaks down your text into "bricks" and "mortar." Mortar words are usually short ("a," "the," and "that" are good examples); they make up about 60 percent of a well-written text. The other 40 percent should be composed of so-called bricks, which are less-common words that convey more information.

Readability does not directly support any word processors; you must convert documents to ASCII format and then import them. The next version should support the most popular word

processors and .DIF files. Another problem is that the grade-level readability rating is based on a Swedish index; you'll have to translate the rating to an American grade level.

Many competent writers will appreciate **Readability's** conscientious policing of long-windedness. But those who are anxious about grammar and spelling would do well to look elsewhere.

List Price: **Readability**, \$59.95.

Requires: 256K RAM, one disk drive, DOS 2.0 or later. Not copy protected. Scandinavian PC Systems, 51 Monroe St., #707A, Rockville, MD 20850; (800) 628-2828.

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READ WHAT PC MAGAZINE SAID ABOUT NORTHGATE'S 386*

FIRST LOOKS

Northgate Power 386: Premium Performance at a Bargain Price

PC HANDS ON

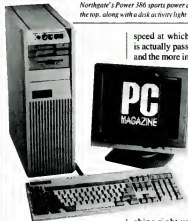
BY BILL O'BRIEN

Field-leading 386 performance just got cheaper. Northgate Computer Systems' Power 386 rivals the power of the Compaq Deskpro 386/20 at a fraction of the cost.

The Power 386 is an upright, 20-MHz floor model with a base price of \$4,295—including a high-performance 65MB hard disk.

A 64K static RAM memory cache deserves much of the credit for the Power 386's performance. Like the Deskpro 386/20, the Power 386 maintains a high-speed, 32-bit path to memory, separate from the I/O bus.

Whereas the 386/20 makes use of Intel's sophisticated cache controller chip, however, the Power 386 falls back on a direct-map static RAM system composed of discrete logic components. Compaq's solution no doubt earns it memory



Northgate's Power 386 sports power and reset switches at the top, along with a disk activity light. Inside are eight slots.

access performance gains in some cases, but the Power 386 won't be far behind.

The hard disk drive does not have an overly spectacular track-to-track access time—28 milliseconds—but that is a mechanical measurement of disk capability. Data throughput, the

speed at which the information is actually passed across the bus and the more important measure of performance, rates as spectacular when hard disk caching is enabled. But even without caching, the large- and small-record times for the PC Labs benchmark tests rank the Power 386 machine right up there with the Compaq Deskpro 386/20.

The standard configuration includes a 14-inch monochrome monitor, one 5¼-inch 1.2MB floppy disk drive, and one 3½-inch 1.44MB floppy drive. That leaves you with one empty half-height bay.

Whether you purchase

PC FACT FILE

Northgate Power 386

Northgate Computer Systems
13895 Industrial Park Blvd.,
#110
Plymouth, MN 55441

List Price: With 1MB DRAM, 64K SRAM cache, one 5¼-inch 1.2MB floppy disk drive, one 3½-inch 1.44MB floppy disk drive, 65MB hard disk, monochrome monitor, \$4,295.

In Short: The Power 386 delivers top performance and intelligent design at an excellent price.

this 386-based machine for its price tag or for its performance, the chances are that you won't be disappointed. Watch *Microsoft Windows* load quickly for a change, or observe a pull-down menu snap up like a runaway window shade, and you will finally get an honest feel of what speed is all about.

*NOTE: Reprinted in full without editing, to give you the complete picture.

© PC Mag., July 1988, Ziff-Davis Communications Co.

OTHER EXPERTS AGREE...

Steve Gibson, InfoWorld, 3/21/88

"It's no coincidence that (the) 386 Northgate Tower is Steve's Dream Machine... (it is) the best possible personal machine for the least possible money."

Computer Shopper, 6/88

"The Northgate 386 Tower is an impressive system. Operating approximately eighteen times faster than the original PC..."

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Mitsubishi's MP286L: 12-MHz Speed, Dazzling Screen Display

PC HANDS ON

BY ALFRED POOR

The Mitsubishi MP286L may look like a traditional laptop computer—with its clamshell case and LCD screen—but the MP286L is a breed apart. It has no batteries and must be plugged into a handy wall socket before it will do anything useful for you. But several rather unusual features make the MP286L laptop an attractive choice if you're willing to sacrifice battery power.

The first unusual feature becomes immediately apparent when you flip on the power. The MP286L display sports jet black characters on a paper white background. The combination is easy on the eyes, possibly due to the high contrast between the characters and the backlight. The screen is a comfortable 6½ by 9 inches and displays graphics with the standard aspect ratio and the display shows up to four shades of gray.

As you might expect from its name, the MP286L is a 286-based computer, running with



one wait state. You can also switch the MP286L down to 8- and 6-MHz settings. The machine comes standard with 640K RAM. A proprietary expansion slot accommodates an additional 2MB of memory. There are two additional expansion slots but the slots are of a proprietary design; you'll have to wait for Mitsubishi or other vendors to design add-in boards for the MP286L if you want to expand.

Fortunately, the machine comes with a full complement of I/O ports as standard features. On the rear panel, you'll find two 9-pin serial ports, a

CGA adapter, a parallel port, and a connector for an external floppy disk drive.

There is plenty inside the box as well. A 3½-inch drive reads and writes 3½-inch 760K and 1.44MB floppy disks. You also get a 20MB hard disk drive. Rated at 68 milliseconds, the hard disk drive is not particularly fast. To improve disk performance, however, Mitsubishi includes PC-Kwik, a software disk cache.

Other notable features include a reset switch on the front of the display area and a power supply that can be switched to 220-volt operation for travel abroad. All this is packed into a definitely totable 14.6 pounds.

But the MP286L is not without flaws. To start with, its display character set is distracting. Characters with descenders, like "g" and "p," don't reach the baseline and some characters—most notably the capital "Y"—are a bizarre combination of thick and thin lines.

At a list price of \$3,995, the MP286L is a competitive value; a comparably equipped 12-MHz Compaq Portable III re-

PC FACT FILE

Mitsubishi MP286L
Mitsubishi Electronics
America Inc.

Computer Systems Division
991 Knox St.
Torrance, CA 90502
(213) 515-3993

List Price: Model 210 with 640K RAM, dual 1.44MB floppy disk drives, \$3,195; Model 220 with 640K RAM, 1.44MB floppy disk drive, 20MB hard disk, \$3,995; 2MB RAM expansion board, \$1,530.

In Short: 12-MHz performance in a low-cost clamshell design, featuring a high-contrast black-on-white display.

CIRCLE 432 ON READER SERVICE CARD

tails at \$4,999. The MP286L's speed, high-contrast screen, reasonable weight, and full complement of I/O ports also make it particularly attractive. The display characters and keyboard layout could stand improvement, but these are somewhat subjective issues. If these factors and the lack of standard expansion slots don't bother you, the Mitsubishi MP286L may well be your best buy in a transportable computer.

PC LABS

Benchmark Tests: Mitsubishi MP286L vs. Compaq Portable III

The Mitsubishi MP286L leads the Compaq Portable III slightly on processor- and memory-intensive tasks, measured by the 80286 Instruction Mix test and the Conventional Memory test. The Mitsubishi's 70-millisecond hard disk lags only moderately behind the Compaq's 28-ms. thoroughbred on the DOS File Access throughput tests, thanks largely to the Mitsubishi's disk caching software. Both machines run at 12 MHz.

Performance Times (Times given in seconds)	80286 Instruction Mix	Conventional Memory	DOS File Access (small record) with cache	DOS File Access (large record) with cache
Compaq Portable III	6.04	0.86	66.79	13.46
Mitsubishi MP286L	5.84	0.85	78.80	14.79

The 80286 Instruction Mix benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 80286 instruction code. These instructions are a subset of the total processor instruction set.

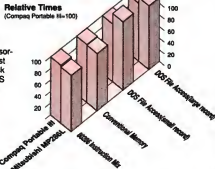
The Conventional Memory benchmark test allocates 256K of conventional memory and treats it as a series of 64K-byte records. Then, 18,384 random records

are read into and written from this memory. The result shown is the average of the read and write times.

The DOS File Access benchmark test measures the throughput rate of the disk being tested. In this case, throughput times are measured in terms of how long the disk takes to perform common DOS file-management functions: Five tasks—file creation, sequential file write, sequential file read, random file write, and random file

read—are timed and the results summed.

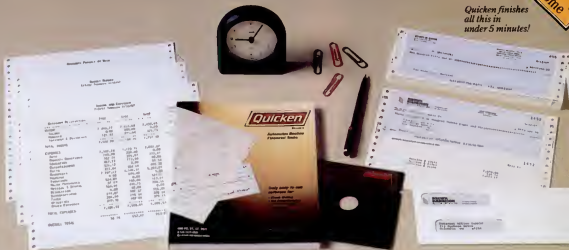
The test is carried out for two different types of files—small-record files and large-record files—that are used by common PC applications. Files created using small records are typically used by database management programs, and large records are typically used for word processing and spreadsheet files. Leading a DOS program is also simulated by the large-record test.



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Browse and Manage AutoCAD Files, with or Without AutoCAD

PC HANDS ON

BY JEFF PROSISE

AutoCAD's success as the premier PC CADD package has spawned hundreds of third-party software products. The latest of these, Cyco International's *AutoManager*, fills a previously vacant niche in the market: that of an all-around *AutoCAD* drawing manager.

AutoManager permits you to view, copy, rename, and erase *AutoCAD* drawing files without running *AutoCAD* itself. A graphical user interface, complete with pull-down menus, makes *AutoManager* a snap to learn and use.

The copy, rename, and erase features won't let you do anything you can't do with DOS. They do, however, make file manipulations simpler by allowing you to work through a shell-like interface. If you have drawing files scattered over several subdirectories, *AutoManager* eases the job of cleaning them up and transferring them between directories.

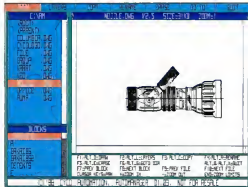
AutoManager's strongest drawing card is its ability to read .DWG files without alteration and display them just as you would see them on an *AutoCAD* screen. Drawings produced by

AutoCAD, Versions 2.0, 2.5, 2.6, and 9.0, are supported. Browsing through a lengthy list of drawings is as easy as pressing a function key to advance to the next drawing or return to the last one; *AutoManager* brings them up one at a time in an on-screen window. *AutoCAD*, by contrast, requires several steps to switch drawings, making browsing a chore.

Browsing with *AutoManager* isn't limited to just one view of the drawing file. Zooms and pans are fully supported, as is the capability to selectively toggle individual layers on and

off. Blocks can be broken out by name and viewed one at a time. You can even invert the foreground and background of the black-and-white image by pressing Alt-I.

But the package isn't without drawbacks. There is no mouse support, even though the menued interface would smoothly accommodate a pointing device. Colors applied in *AutoCAD* to embellish drawings are lost in *AutoManager*. And, most surprisingly, *AutoManager* doesn't support a math coprocessor. Cyco Automation claims that *AutoMan-*



AutoManager's pull-down Files menu lists *AutoCAD* files in the active subdirectory and the blocks of the current drawing. Command keys are defined on-screen.

PC FACT FILE

AutoManager

Cyco International
1908 Cliff Valley Way
Atlanta, GA 30324
(404) 634-3302
List Price: \$199

Requires: 256K RAM, DOS 2.0 or later.

In Short: An *AutoCAD* file manager that enables you to view and manipulate your *AutoCAD* drawing files without running *AutoCAD* itself. Not copy protected.

CIRCLE 434 ON READER SERVICE CARD

ager will draw up to ten times faster than *AutoCAD*, even without a math coprocessor. While that may be true for *AutoCAD* running without the benefit of a math coprocessor, our informal tests showed *AutoManager* to be only marginally faster, and in some cases slower, than *AutoCAD* running on an 80287-equipped machine.

AutoManager is nonetheless an appealing utility, especially if you manage *AutoCAD* drawings for a group of users or handle large volumes of drawing files. If *AutoManager's* display speeds were improved—perhaps by adding support for a math coprocessor—the package would instantly become a must-buy for all but the most casual *AutoCAD* user.

ScreenExtender: Full-Screen WordStar Display

PC HANDS ON

BY WINN L. ROSCH

If you want to see more of what you're doing when working in *WordStar Professional* 4.0, take a look at *ScreenExtender*, from Stairway Software. *ScreenExtender* puts up to 58 rows and 160 columns of text—the equivalent of a complete page of wide-carriage output—on your graphics-capable display.

To install *ScreenExtender*,

you first patch your *WordStar* using the automatic mode of the WSCCHANGE program and a file of patches provided by Stairway Software. Then, each time you use *WordStar*, you run a terminate-and-stay-resident program to activate *ScreenExtender*.

You press Alt-M to pop up the *ScreenExtender* menu over any *WordStar* screen—menu or document. The menu allows control over colors, number of rows and columns, and display attributes.

ScreenExtender supports CGA, EGA, VGA, MGA, and Hercules video standards. You get up to 33 rows of text with a CGA display and up to 58 rows with the others. Hercules displays can provide up to 180 columns of text; the other standards can muster 160.

The package has but two problems. Although readable, the characters in its long and wide modes can be small and hard to read. That's to be expected. Second, the program doesn't work very well. That's

unforgivable. It crashed on loading in a 386 clone, and it ran for a while but then crashed when switching modes in a True Blue Model 60. Workable, perhaps; bulletproof, no.

List Price: *ScreenExtender*, \$59.95. Requires: *WordStar Professional* 4.0; Hercules, CGA, EGA, MCGA, or VGA display. Not copy protected. Stairway Software, 700 Harris St., #204, Charlottesville, VA 22901; (804) 977-7770.

CIRCLE 443 ON READER SERVICE CARD

C>ERASE *.*

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Disk Optimizer includes *Findfile* for locating files by name or wildcard anywhere on your disk. *Sorts* for re-arranging files and directories in the way that makes sense to you. *Lock* and *Unlock* for password-protected file security. *Killfile* for erasing sensitive data permanently. And lots more. In all, there are 17 different programs in the new Disk Optimizer. Each one designed to improve performance, guard your data, and make disk management easier and simpler for everyone.

So get new Disk Optimizer 4.0, and get more than the courage to say yes. Get the peace of mind and total confidence that your disk is running better and safer all the time.



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- 200 Watt Power Supply
- 80287 or 80387 Coprocessor
- 1 - 32 Bit Slot

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- 200 Watt Power Supply
- 80287 or 80387 Coprocessor
- 1 - 32 Bit Slot

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- 200 Watt Power Supply
- Socket for 80287 Coprocessor

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- Western Digital 2F-2H Controller
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CIRCLE 390 ON READER SERVICE CARD

NEW ON THE MARKET

by Jonathan Matzkin

AlphaWorks Package
Compatible with Both
Lotus and dBASE Files

Competing with *Microsoft Works* and *PFS:First Choice* in price and functionality, *AlphaWorks*, from *Alpha Software Corp.*, is making a bid for the integrated software market.

The \$195 package incorporates word processor, spreadsheet and graphics, database management, and communications programs.

The database module accepts *dBASE*, *DBF*, *NDX*, and *DBT* (memo field) formats, and the spreadsheet uses the *WK1* (*Lotus 1-2-3*, Release 2) file format. The database size is limited only by memory, with up to 128 fields per record. LIM expanded and extended memory are supported. The spreadsheet's maximum size is 8,192 rows by 255 columns.

A 100,000-word spelling checker and a 120,000-word thesaurus are included with the word processor.

AlphaWorks lets you view two different files in two different modules with a half-screen window. You can have up to nine files open in any module, and a total of 29 open altogether. A single Alt-key combination gets you from one application service to another.

The interface throughout *AlphaWorks*' module is consistent, with a choice of pull-down

or moving-bar menus.

List Price: *AlphaWorks*, \$195. Requires: 512K RAM, one disk drive, DOS 2.0 or later. Not copy protected. *Alpha Software Corp.*, One North Ave., Burlington, MA 01803; (617) 229-2924.

CIRCLE 438 ON READER SERVICE CARD

Tiny Hand-Held Unit
Puts DOS in Your Palm

DOS seems to come in smaller and smaller packages. Perhaps the smallest is the PC/5000, from *Micro Palm Computers*. Intended to go where even laptops fear to tread, the *Micro Palm PC/5000* packs MS-DOS and up to 2.2MB of memory into a 3.25- by 10.4- by 5.38-inch (HWD) package. It weighs a featherly 2.9 pounds.

The \$3,295 PC/5000 has removable, battery-backed RAM modules that function like disk drives. The PC/4000, identical except that it lacks the removable "drives," sells for \$2,395. The LCD is a 20-character by 8-line display screen with graphics capability. The 51-key keyboard has 10 function keys and alphabet keys arranged in alphabetical, rather than QWERTY, order.

The system also has two serial ports and a bidirectional parallel port. There is an optional modem, and the system supports bar code readers, scan-



The \$3,295 *Micro Palm PC/5000* handheld computer takes DOS places where it wouldn't normally be able to go.

ners, and printers, among other I/O devices.

In addition, *Micro Palm* offers a communications software package that allows file transfer between the PC/5000 and desktop PCs.

List Price: *Micro Palm PC/5000*, \$3,295; *PC/4000*, \$2,395. *Micro Palm Computers*, 13773-500 180T Blvd., Clearwater, FL 34620; (813) 530-0128.

CIRCLE 440 ON READER SERVICE CARD

HOT
PROSPECTTandy Speeds Up the 4000, Adds
Music Capability to the 1000

The Tandy 4000 LX is the fastest computer yet introduced by *Tandy Corp.* The 20-MHz 80386 AT bus machine has a starting price of \$3,999 and comes standard with 2MB RAM. The 16-MHz Tandy 4000 remains available.

At the other end of the performance spectrum, Tandy has added two new models—the 80286-based 1000 TL and the 8086-driven 1000 SL. Both machines have powerful digital music recording and playback capabilities, Tandy says. Sounds are input through a microphone/audio jack and played back through a built-in speaker or through a headphone jack

that has its own volume control. Sounds can be extensively edited and even overdubbed. Two *DeskMate* applications, *Music* and *Sound*, access the audio capabilities of the new machines. *Music* generates music notation that can be sent to a printer, according to Tandy.

The machines are equipped with DOS 3.3, Tandy's *DeskMate* user interface, and an 80,000-word spelling checker stored in ROM. Serial and parallel ports are standard, as are joystick ports and on-board video support.

The \$1,299 Tandy 1000 TL comes with 640K RAM, a real-time clock, and a single 3½-inch 720K floppy disk drive. The \$899 Tandy 1000 SL has 384K RAM standard, and a single 5¼-inch 360K disk drive. List Price: Tandy 4000 LX, from \$3,999; Tandy 1000 TL, \$1,299; Tandy 1000 SL, \$899. *Tandy Corp.*, 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3700.

CIRCLE 435 ON READER SERVICE CARD



Tandy's newest 1000 series computers, the \$1,299 1000 TL and the \$899 1000 SL, have powerful music recording and editing capabilities.



An integrated word processor, spreadsheet, database, and communications package, *AlphaWorks* (\$195) can show two processes simultaneously.

NEW ON THE MARKET

Space, the Final Frontier: WORM Drive Offers Huge Capacity, Winchester Speed

A new optical disk drive from **Maximum Storage** offers enormous storage capacity and high performance for databases and other applications that generate huge amounts of data.

Maximum offers a 5¼-inch WORM (write-once, read-mostly), which, it reports, significantly outperforms other systems. The Maximum Storage APX-4000 subsystem (\$4,450 for external mount, \$4,250 for internal mount) can write up to 500MB to a single optical disk. Maximum says that access times rival those of high-performance Winchester disk drives. The company claims that the subsystem can access and read a 1MB file in approximately 4 seconds.

The APX-4000 is a complete plug-and-play subsystem and includes the optical disk drive, a controller card, cables, and MAXSYS operating software. **List Price:** Maximum Storage



The Maximum Storage APX-4000 subsystem stores as much as 500MB on a single WORM optical cartridge.

APX-4000, external mount, \$4,450; internal mount, \$4,250. **Requires:** 78K RAM, DOS 3.0 or later, half slot. MAXSYS operating software not copy protected. Maximum Storage Inc., 5025 Centennial Blvd., Colorado Springs, CO 80919; (719) 531-6888.

CIRCLE 437 ON READER SERVICE CARD

Network Diagnostic Machine Is Portable, Works with Ethernet

The evocatively named **Network Sniffer**, from **Network General**, is a laptop-based protocol analyzer and diagnostic tool for Ethernet-based local area networks. The self-contained Sniffer is housed in a To-

shiba T3200 laptop with a 12-MHz 80286 processor and a 40MB hard disk. It weighs 19 pounds.

The Sniffer (base price, \$15,000) works with virtually all popular Ethernet protocol models, according to Network General, including TCP/IP, DECnet, XNS, NFS, ISO, APPC, NetBIOS, and NetWare. It collects, records, and analyzes network data and monitors network performance. Because it is completely portable, the Sniffer can be moved among multiple networks.

The included software, Version 1.3, features graphical display of network activity levels, enhanced traffic generator capabilities, and improved protocol

The **Network Sniffer** (\$15,000) is a complete network diagnostic tool contained in a Toshiba T3200.



analysis. A three-window, multilevel menu system affords views of one protocol level or all subsequent levels in memory, as well as byte-by-byte English language interpretation of network protocols. There is a high speed capture mode that instantaneously captures every frame, and the software allows synchronized scrolling of multi-window data displays. The software also allows remote operation from a PC connected to a phone line.

List Price: The Network Sniffer, from \$15,000. **Requires:** Ethernet network. Network General Corp., 1945A Charleston Rd., Mountain View, CA 94043; (415) 965-1800.

CIRCLE 439 ON READER SERVICE CARD

Lotus Add-in Links Worksheets On-disk to Worksheets in Memory

Goldata Computer Services offers @WSLINK, a Lotus add-in that dynamically links data in

Symphony and *Lotus 1-2-3* worksheets on-disk to worksheets in memory. The \$49.95 utility lets you specify not only the worksheet to be linked but also the cells in the spreadsheet.

An unlimited number of spreadsheets can be referred to, and @WSLINK requires only 19K RAM, Goldata says. The program is network compatible; it recognizes when other users have saved changes on dependent worksheets, and it then updates values in the current worksheet in memory on the next recalculation.

@WSLINK reads 1-2-3 or *Symphony* file formats, so users can link 1-2-3 and *Symphony* worksheets interchangeably, according to Goldata.

List Price: @WSLINK, \$49.95. **Requires:** 19K RAM, DOS 2.0 or later, *Lotus 1-2-3* or *Symphony*. Not copy protected. Goldata Computer Services Inc., 2 Bryn Mawr Ave., Bryn Mawr, PA 19010; (215) 525-1036.

CIRCLE 442 ON READER SERVICE CARD

New AST 80286 Machines Incorporate Their Graphics Modules into Motherboard

Over the last couple of years **AST Research** has risen from the pack of compatibles manufacturers to offer innovations of its own. AST has added five new AT-class systems to its 80286-based product line, which has been rechristened the **AST Premium Workstation/286**. The new machines, which are intended for September shipment, have motherboard receptacles for graphics modules that support either monochrome (\$145) or VGA (\$445) graphics.

The systems run at either 6 or 10 MHz and come with 512K or 1MB RAM. Standard are two serial ports, a bidirectional parallel port, and 80287 coprocessor support. The system boards have connectors for floppy and hard disk controllers in addition to the graphics module. Each

machine also has two full-length 8- or 16-bit expansion slots.

The diskless **AST Premium Workstation/286**, Model 100x, with 512K RAM, has a suggested list price of \$1,695. The Model 103x adds a 3½-inch 1.44MB floppy disk drive and costs \$1,995.

The \$2,995 Model 143x features a 40MB hard disk drive and a 3½-inch 1.44MB micro-floppy disk drive. The Model 145x has the same list price and substitutes a 5¼-inch floppy disk drive.

List Price: AST Premium Workstation/286, Model 100x, \$1,695; Model 103x, \$1,995; Model 143x and Model 145x, \$2,995. AST Research, 2121 Alton Ave., Irvine, CA 92714; (714) 863-1333.

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Microsoft's COBOL 3.0 Brings Mainframe Compatibility to the PC

PC HANDS ON

BY ROBERT L. HUMMEL

Forget what you know about earlier versions of Microsoft COBOL. With the release of Microsoft COBOL, Version 3.0, Microsoft has essentially relabeled the Micro Focus compiler and debugger as its own. By combining its knowledge of DOS and OS/2 with an existing, proven compiler, Microsoft is positioning MS-COBOL 3.0 for serious program development in the DOS and OS/2 environments.

The ability to support popular COBOL language extensions, or "dialects," is one of the most significant features of the compiler. It conforms to the highest possible certifiable level of the ANSI 85 COBOL standard, allowing source-code-level compatibility between mainframes, minicomputers, and PCs. Microsoft COBOL 3.0 offers compatibility with ANSI 74 COBOL, IBM OS/VS COBOL, IBM VS COBOL II, IBM PC COBOL, IBM COBOL/2, RM/COBOL, Micro Focus Professional COBOL, Data General Interactive COBOL, and

X/OPEN Standard COBOL.

While source code written to the ANSI standard can be transportable between systems, the compiler produces optimized native code for the PC.

Support for programming in a network environment includes file sharing and program-to-program communication. Files can be accessed on an exclusive or shared basis and locked at the record level. Updates can be carried out at the end of a transaction. In addition, the standard COBOL SEND and RECEIVE statements can exchange information between programs running on different computers via the network.

MS-COBOL 3.0 doesn't use CodeView, Microsoft's flagship debugger. Instead, it comes with its own debugger, called the Animator, which allows COBOL programs to be debugged at the source code level. Programs can be viewed and executed as COBOL statements, so there's no need to learn assembly code and hexadecimal. Animator supports breakpoints (normal and periodic), backtracking, and an immediate mode that can evaluate COBOL expressions.

To test the operation of the compiler, I dug out the benchmark tests used in the last *PC Magazine* review of COBOL compilers ("Programming Makes Sense for Business: COBOL," *PC Magazine*, October 29, 1985). The programs compiled and ran with no problems—a testament to the endurance of the COBOL standard.

The .EXE files that were produced by COBOL 3.0 compiled and executed much faster than those of Microsoft's previous compiler. They were also much larger. Clearly the optimizer is tuned for speed at the expense of size.

While testing, I turned up a few quirks with the operation of the compiler. Although a command-line compiler and not an environment, the COBOL.EXE compiler program sporadically changed my cursor size and screen colors. It was also unable to handle screens displaying more than 25 lines, producing some bizarre behavior.

Much to my surprise and frustration, the Ctrl-C key combination is interpreted as a character instead of a termination request. Pressing Ctrl-Break in response to a prompt does cause

PC FACT FILE

Microsoft COBOL, Version 3.0
Microsoft Corp.
16011 NE 36th Way
Box 97017
Redmond, WA 98073-9717
(206) 882-8080
List Price: \$900
Requires: 384K RAM; hard disk drive; DOS 3.0 or later, or OS/2 1.0
In Short: An ANSI 85-standard COBOL compiler that supports many dialects. Not copy protected.

CIRCLE 444 ON READER SERVICE CARD

the compiler to stop, but not until you follow it with a press of the Enter key. And any mistake on the command line produces a cryptic, not to mention irritating, error message.

The advent of superfaster PCs based on 80286 and 80386 processors, hard disks with capacities over 100MB, and the promise of virtual memory have provided an excellent hardware platform for COBOL development. Despite its quirks and list price of \$900, the dialect support and Animator debugger make Microsoft COBOL 3.0 a worthwhile purchase. [E]

525 Pages of Programmer's Reference

PC BOOK REVIEW

BY SALVATORE P. RICCIARDI

No single reference combines everything you need to know to program PCs. *The Programmer's PC Sourcebook*, by Thom Hogan, is a step in the right direction.

The book succeeds because of its thoroughness. It includes more technical information, from a larger variety of sources, than any other PC reference book I've seen. The variety of information covered includes everything from DOS com-

mands and function calls to peripheral-support-chip data and *Microsoft Windows 2.0* structure formats.

The information is presented in tables and charts, each nicely customized to its purpose. For example, the tables used for the DOS and BIOS function calls show CPU register information before and after the call, as well as a description of any associated data areas. A pointer to the initial mention of information is included with each table, as are "see-also" references to other areas of the book.

Despite its 525 pages of useful information, the *Sourcebook*

fails to cover a few important topics. Specifically, not included is information on the com-



monly used but undocumented DOS functions (such as those required for programming TSRs), the Hayes Smartmodem command set, and EMS 4.0.

You also won't find theory or how-to here—*The Programmer's PC Sourcebook* is strictly a reference. But if you're an experienced DOS programmer and could use a single source for facts and detailed technical data, this book deserves a place on your desk.

List Price: *The Programmer's PC Sourcebook*, by Thom Hogan, \$24.95. ISBN: 1-55615-118-7. Microsoft Press, 16011 NE 36th Way, Box 97017, Redmond, WA 98073-9717; (206) 882-8080.

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Windows Open (maximum)	6	2	8	1	1
Files Open (maximum)	24	2	8	1	1
Cross-Reference (dynamic)	●	○	○	○	○
Indexing Options	7	1	3	3	○
Columns: Parallel	●	●	●	●	●
Snaking (chg. * same page)	●	●	Not same pg.	○	●
H-P LaserJet Support	Full	Partial	Full	Partial	Full
PostScript Support	Full	Text	Full	○	Text
Mouse Support (integrated)	●	○	●	○	○
Dynamic Shortcuts	●	○	○	○	○
Alternative User Interfaces	●	○	○	○	○
Verify Spelling as you type	●	○	○	○	○
Programmable Macro lang.	●	○	○	○	○
Save File ¹	5.9	41.1	9.7	4.4	1.0
Top to Bottom ²	7.5	7.5	49.4	8.1	21.0
Search and Replace ³	1.6	8.6	4.6	17.1	13.4
Find Unique Word	3.3	8.2	7.0	13.8	20.6
Suggested List Price	\$199.95	\$495.00	\$450.00	\$495.00	\$565.00

Times listed were performed on an Acer 286 (8 MHz), 640K RAM. ¹File size 100K. ²1630 lines ³14 occurrences. Times shown are in seconds.

(Benchmark details available upon request.)

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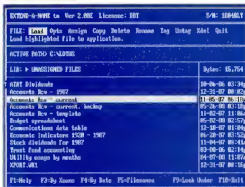
PC HANDS ON

BY DONALD B. TRIVETTE

It takes either an elephant or a computer to remember a filename 6 months after it's created. If you haven't got room for the pachyderm, you'll want a copy of *Extend-A-Name*, from World Software Corp. This nifty TSR lets you use up to 60 characters to describe a file.

The descriptive filenames are recorded in a hidden file and linked to the real DOS filenames. When a program requests a file, an *Extend-A-Name* window pops up, complete with 60-character names for the appropriate files. You pick the file you want by the point-and-shoot method.

The installation routine includes triggers for most popular software, and a user-defined trigger option lets you set up the program to work with other applications. You won't be able to use *Extend-A-Name* with all your applications, however: *Extend-A-Name* looks for text-type screen prompts as a trigger, so the program won't work with



Extend-A-Name, from World Software Corp., automatically pops up its file selection window each time you call for a file from your application.

graphically-oriented programs like *Microsoft Word* and *Alldas's PageMaker*.

Extend-A-Name does not alter or rename DOS filenames, so you can continue to use regular DOS commands as well as utility programs such as *PC Tools*. The pop-up window also has a number of utility functions of its own. You can move, copy, rename, and delete files as well as create, rename, and

delete the extended names.

In an unusual twist, World Software ships six versions of the program in each package. The versions differ in the amount of RAM the TSR will occupy and the number of files allowed. At the low end, version A supports 100 files per subdirectory and occupies 39K. Version E supports 400 files per subdirectory and occupies 65K. The sixth version uses expanded

memory, occupying only 3K of conventional memory.

All in all, *Extend-A-Name* is a smooth package that has the feel of well-engineered and thoroughly tested software. Its inability to work with graphically formed text programs and its RAM-hungry nature are obvious drawbacks, but these may be minor prices to pay for the convenience of being able to quickly find version 3 of your last year's preliminary tax deductions.

PC FACT FILE

Extend-A-Name

World Software Corp.

124 Prospect St.

Ridgewood, NJ 07450

(201) 444-3228

List Price: \$79.95

Requires: one disk drive, DOS 2.0 or later.

In Short: A memory-resident program that lets you use up to 60 characters to describe a file while leaving the DOS filename intact. Not copy protected.

CIRCLE 430 ON READER SERVICE CARD

A Mouseless Menu for WordPerfect

PC HANDS ON

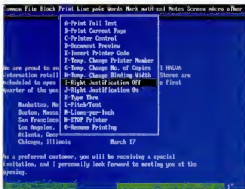
BY EDWARD MENDELSON

Most add-on menus for *WordPerfect* work only with a mouse. Applause Software's \$54.95 *Perfect Addition* provides those who don't like mice with a set of customizable pull-down menus for *WordPerfect*, Versions 4.1 through 5.0. You can use a mouse with *Perfect Addition* if you insist, but you don't have to.

After you call up the main menu from a hotkey, the pull-down menus let you choose about 175 common *WordPerfect* functions, some of them normally a few menus deep in *WordPerfect* itself. When you choose a function, you drop into a *WordPerfect* menu. With the menus on-screen, the Tab key

brings up a reference screen with a list of the equivalent keystrokes and a brief explanation. Another hotkey lets you repeat

the last function you chose without going through the menus—a unique feature not available in *WordPerfect* itself.



Perfect Addition offers some 175 *WordPerfect* commands from its pull-down menus. Some functions drop you into a *WordPerfect* menu.

You can customize the menus by adding your own macros. This feature lets a corporation add its standard letterhead or boilerplate to every menu in the office. You can also add uncommon *WordPerfect* functions from a predefined master file supplied with the package. You'll have to spare 81K RAM to keep the program in memory.

If you don't mind using a mouse, you're probably better off with *MousePerfect's* \$35 *MousePerfect 5.0*. *Perfect Addition* is an attractive alternative for those who'd rather keep both hands on the keys.

List Price: *Perfect Addition*, \$54.95. **Requires:** 384K RAM for use with *WordPerfect* 4.1, 4.2; 640K RAM with *WordPerfect* 5.0. Not copy protected. Applause Software P.O. Box 952 Denver, CO 80034; (303) 424-1967

CIRCLE 431 ON READER SERVICE CARD

"Most people we meet who give Paradox a try, end up switching to it"

Mark Cook and Steve King, Data Based Advisor



Here's what Data Based Advisor had to say about Paradox:

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"Finally, as the frosting on the applications developer's Paradox cake, it'll only cost you \$9.95 to buy the run-time version of Paradox to distribute [unlimited] copies of your application."

Macros save programming time

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Paradox is the one we choose!

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Excerpts from Mark Cook and Steve King's review of Paradox in Data Based Advisor, January 1988.

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- Dual Speed 8/12 MHz, 0 Wait State
- Landmark 16 MHz
- Eight Expansion Slots
- 20WAT UL Power Supply
- One 1.2MB Floppy Drive
- Dual Floppy and Hard Disk Controller
- 1 Parallel, 2 Serial, Real Time Clock, Game Port
- Enhanced 101-Key with Tactile Feel Keyboard
- O/S 2 Compatible, EMS System on Board
- Operations Manual
- One Year Warranty

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- Eight Expansion Slots
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- One Floppy and Hard Disk Controller
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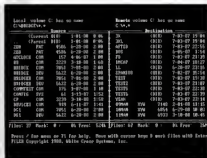
CIRCLE 736 ON READER SERVICE CARD

PC UPDATE

by Paula Seefeldt

The Brooklyn Bridge Adds Dual-Directory Display

The Brooklyn Bridge, the software utility from White Crane Systems, now operates with a dual-directory file manager display and a "Run" utility that provides dual independent processing. Version 2.0 also offers a point-and-shoot menu and four enhanced DOS utilities.



The Brooklyn Bridge now offers a dual-directory display.

ties: Move, Remove, Copy, and Backup. Upgrades are free to users who purchased after May 9, 1988; other users may purchase the upgrade for \$35. Retail price is \$139.95. White Crane Systems Inc., Norcross, GA; (404) 394-3119.

Turbo Apprentice 4.0 Eliminates File Searching

Cypress Systems has added a productivity tool to **Turbo Pascal**, Version 4.0. **Turbo Apprentice**, Version 4.0, automatically scans program and library files and indexing information on units and procedures within Pascal. A Turbo Help key works with Pascal's context-sensitive help to provide instant access to reference information. **Turbo Apprentice 4.0** retails for \$25. Cypress Systems Inc., Los Angeles, CA; (213) 207-3038.

Dragnet 1.1 Works with Windows

Access Softek has announced a new version of its search-and-retrieval program, **Dragnet**. **Dragnet 1.1** is compatible with *Microsoft Windows/286* and *386* and can multitask with all major *Windows* applications. Updates from Version 1.0 are available for \$10, and new packages retail for \$145. Access Softek, Berkeley, CA: (415) 654-0116.

InSet Systems Supplies OS/2 Support

InSet Systems now provides OS/2 support for the updated graphics utilities *HJuaak* and *InSet*. *InSet* 2.2 also includes a printer-ready "fast" file to increase speed. *HJuaak* 1.1 and *InSet* 2.2 will retail for \$99 each, with a bundled version available for \$149. Registered users of *InSet* 1.0 can upgrade for \$30 and *InSet* 2.0 users for \$15. InSet Systems Inc., Danbury CT; (203) 794-0396.

Framework III Offers E-mail Support

Ashton-Tate has released a new version of **Framework**, the integrated decision-support software package. **Framework III** supplies mouse support, a thesaurus, networking, and a memory-management feature. E-mail support is optional in **Framework III** but is included with **Framework III LAN**, the five-user version. **Framework III** retails for \$695; the e-mail option retails at \$100. **Framework III LAN** is scheduled to ship in the third quarter of the year and will retail for \$995. Ashton-Tate Corp., Torrance, CA; (213) 329-8000.

SuperCalc5 Adds HotLinks

Computer Associates International has redesigned its **SuperCalc** spreadsheet package to include hotlinks to independent multiple spreadsheets. **SuperCalc5** can also provide hotlinks to multiple pages of a single spreadsheet. Other enhancements include presentation-quality graphics and a spreadsheet auditing and debugging feature. **SuperCalc5** will ship in the third quarter of the year. Upgrades are free to users who subscribe to Computer Associates' SupportPlus Maintenance plan. Registered users who purchased after May 23, 1988, will receive an additional \$100 rebate. Upgrades are \$100 for all other users. New packages will retail for \$495. Computer Associates International Inc., San Jose, CA: (408) 432-1727.

Open Access II Plus Uses Statistics Module

Open Access II Plus, the integrated package from Software Products International, provides a statistics module for spreadsheet use. Version 2.10 also uses a spelling checker/auto-hyphenator for word processing and has added a SYS Time feature to the SOL programming. *Open*

#	Number	Weight	Value				
1	0.00	10.00	10.00				
2	1.00	10.00	10.00				
3	0.00	11.00	11.00				
4	0.00	11.00	11.00				
5	10.00	10.00	10.00				
6	10.00	10.00	10.00				
7	10.00	10.00	10.00				
8	10.00	10.00	10.00				
9	10.00	10.00	10.00				
10	10.00	10.00	10.00				
11	10.00	10.00	10.00				
12	10.00	10.00	10.00				
13	10.00	10.00	10.00				
14	10.00	10.00	10.00				
15	10.00	10.00	10.00				
Model C: GENIUS							
			Model:	Estimate:	Current:	CS	LR: N:1
Initial state:							
Description				Estimate	Window		Report: Table
Output Area:							
Initial State:	Yes	No	Yes/No	Value			
Est. Pop. Size, Num.:	Yes	No	Estimate:	Value			
Est. Pop. Num.:	Yes	No	Estimate:	Value			
Sample Size, Num.:	Yes	No	Estimate:	Value			
Sample Num.:	Yes	No	Estimate:	Value			
Est. Num.:	Yes	No	Estimate:	Value			
Comment: Checksum to Sample. Add to initialize the calculation.							

Open Access II
Plus uses a
statistics mod-
ule to compare
spreadsheet
data.

Access II Plus Network features file and record locking and real-time updating for users on a shared spreadsheet. Upgrades are available for \$125 and new packages retail for \$695. Network versions are \$895 for a four-station package. Software Products International, San Diego, CA: (619) 450-1526.

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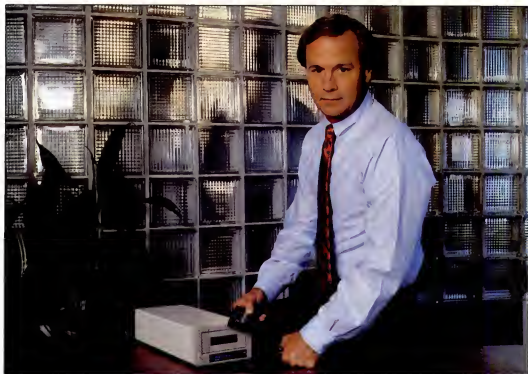


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Winners for this issue: Roger Lyns (replace your mother), Dick Baker (Seybold), Kenneth Greg (AST 3G), Steve Spinella (XyWrite modem software), George Geno (IBM CP/M BIOS).

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■ BILL MACHRONE

BENCHMARK BLUSTER



In the wild and woolly world of benchmark testing, some new voices can be heard, ostensibly to clear things up. Instead, they've only muddied the waters.

Okay, you know the old saw about lies, damned lies, and benchmarks. In all the heat and light that's been generated in some other publications of late, there's been precious little substance. *PC Magazine*, as the largest, most read, and most widely respected computer magazine, has been something of a target. It's only natural. We have the first, largest, and best-equipped laboratory (not just a room with some computers in it), and benchmark tests that measure the performance of PCs accurately and repeatably.

Some other publications, a little late to the party, have been making up for lost time by raising the noise factor about benchmark testing. Some of this is attributable to good old sharp-elbowed competition. Some of it is intentional obfuscation. And some, regrettably, is just yahoo ignorance.

A benchmark test is a precision tool. Precision tools are best used by people who know what they're doing. A micrometer in the hands of a craftsman is an accurate measuring device. Without understanding its function, you might conclude that a micrometer is a pretty bad C clamp.

For instance, I've read the words "the infamous NOP test." Does *PC Magazine's* 128K NOP test live in infamy? Only in the hearts of the system designers whose caches it defeats. Caching and paged memory certainly give machines a shot in the arm, but is it real power or just amphetamines? We want to know what the true CPU speed is, relative to some reference machines such as the IBM PC AT and the

original Compaq Deskpro 386. The various mips tests and speed indexes we've seen fall short, outfoxed and bamboozled by caching and paging schemes.

BETTER THAN REAL. No, the NOP test is not a real-world test, but neither is the color-bar pattern the technician uses to adjust your TV set. As an analytical tool, however, our CPU benchmark suite is unsurpassed. We've walked into demos and listened politely to the manufacturer's hype about how this machine was going to change the world. Then, after running a few benchmark tests, we were able to say, "Hmm. A 16-MHz 386, uncached, running memory at one wait state. You're emulating EMS in software and the EGA is a real pig. How come it costs \$7,000?" At that point, the marketing guy starts wishing he'd stuck to industrial lubricants, and you can hear soft cussing in a foreign language elsewhere in the room. You can't

draw a bead like that by recalcing a 1-2-3 spreadsheet, no matter how real-world it seems.

Another publication sniffed about our "low-level tests," implying that running application software was the only way to test PCs. We thought so too—once. Then we found that manufacturers and readers were getting results that differed from ours. After some investigation, we found that there were code changes within the same version number of several commercial packages. As minor bugs were fixed during the production run, programmers would put in a few tweaks they'd discovered along the way. That ended our flirtation with application software.

Our Instruction Mix test uses the same kinds of instructions, in roughly the same ratio, as mainstream application software. We start with 8088 instructions, add 286 instructions if the machine can execute them, and do the same for a 386. Will *dBASE III* wring out the 386? Will it tell you the difference between a 386 chip and a 386SX chip? Will last Tuesday's copy of the software even yield the same results as the copy you bought last month? We don't think so.

Furthermore, we own the code. It's all written in assembler, so we know what every byte is doing. We're not subject to the vagaries of compilers and language versions any more than we are to application programs.

We can, and do, give our benchmark test series away at every opportunity. You can pick up a copy at trade shows and user group meetings, or you can download it



Illustration: Dave Cutler

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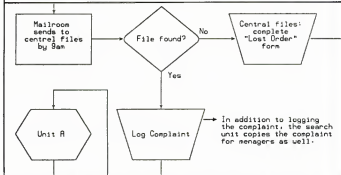
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VIEWPOINTS

■ BILL MACHRONE

from PC MagNet. Hardware designers use our benchmark suite as a convenient way to spot bottlenecks in the throughput of new systems. Shouldn't you have the same tools at your disposal?

WHAT GOOD ARE THEY? Benchmark programs have value beyond selecting equipment to buy. They can also be enormously useful in tuning the performance of existing systems. For example, our video write and scrolling tests dramatically illustrate the increase in throughput you gain when you cache the video BIOS. They also show the difference between latched and unlatched instruction registers, an enhancement made popular by the VGA. Our disk throughput tests show the effect of access time on overall hard disk performance. The same tests either use or bypass disk caching, as you choose.

All such schemes depend heavily on how quickly the machine can get to memory. In these days of expanded and extended memory, not all access schemes are created equal. You can emulate expanded from extended or extended from expanded. Expanded memory access can be delivered in hardware, in software, or in both. You can install your caching and virtual disks in expanded or extended memory. But which works best for your combination of hardware and software? You could time application programs as you go through daily tasks, keeping a trigger finger on your stopwatch. Or you could get a solid answer from our memory access tests.

Is that too much information? Perhaps for some people.

On another topic, what weighs 4.1 pounds, contains more than 5MB of information, comes with a floppy disk, and costs only \$39.95? No, it's not the latest laptop computer. It's *PC Magazine's DOS Power Tools* (ISBN: 0553-34526-5), Paul Somerson's new book that covers more than 200 *PC Magazine* utilities and includes enough productivity tips to keep you happy for a long time to come.

In its first week on the stands, the book zoomed to the top of B. Dalton's best-seller list. Paul wrote the book over a 6-month span and it reflects the collective wisdom of *PC Magazine's* readers, editors, and contributing editors over a 5-year period. Don't miss it.

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■ JOHN C. DVORAK

NEW AGE VILLAINY



Workgroup software now makes it easier than ever for computer-savvy office schemers to sabotage the careers of their unsuspecting colleagues in the workplace.

It's not that I hate workgroup computing. In an ideal world it would be an ideal solution. It's no coincidence that *The Coordinator*, the elaborate software from Action Technologies (the originators of the "workgroup" moniker), evolved from a New Age and so-called Human Potential Movement bias. The designer is a strong "est" (Erhardt Sensitivity Training) advocate. These idealists see the world in ways that do not necessarily reflect reality. But it's reality that will make workgroup computing a blueprint for disaster in any company that relies too heavily on its concepts.

I was recently talking to a friend of mine who works at a big bank. When I asked him about his new promotion, he told me how he got it. He managed to crack the network messaging system so that he could monitor all the memos. He also sabotaged the workgroup software and set back the careers of a few computer-naïve souls who didn't realize that someone was manipulating their appointment calendars. They would miss important meetings and be sent on wild-goose chases, only to look like complete buffoons when they showed up for appointments that were never made. By the time any of these bumpkins knew what hit them, they had a new vice president.

DREAMERS VS. SCHEMERS These schemers don't exist in the imagined world of the New Age idealist, but they do in the real world. The bug-eyed dreamers who think that computers are going to make life easier and more efficient with networks

and workgroup software are only kidding themselves.

Office sneaks have always been around. In the past they have done well using the tried-and-true techniques of the old-fashioned office: poison-pen letters, rifling through in-baskets, pilfering files from open cabinets, lying about other employees, judiciously spreading gossip, and not being there when the goo hits the fan. In the past these unscrupulous characters have been limited by physical barriers to access. Getting caught rummaging through the file cabinet of an associate isn't the way to get ahead. A locked door and a locked file cabinet will stop the casual office rascal. While most of these barriers can be breached, the risk of capture is too high for most sneaks.

Those days are over with the computer. A smart operator can hack his way into nearly any interoffice system. Once done, capture is nearly impossible. Furthermore,

few naive computer users think twice when a fellow employee uses their machine. Most computer-literate sleuths can quickly steal passwords, important files, and other valuable data from the user. Once done, the sky is the limit for chicanery. Workgroup software—with its shared database and "open" appointment calendars—makes sabotage easier than ever, especially if a user gets the top access codes. Provisions to protect against this kind of subversion are a joke.

It all reminds me of the time I got a nasty memo on my MCI Mail account. The guy was bemoaning the fact that the best security systems are ineane and that any kid can crack most systems. At the end of the memo was a note: "If you don't think so, then just look at who sent you this note." I looked at the header and it was sent to me from my own account!

WAGING WORKGROUP WAR Scenario: Suddenly Jim's report not only isn't received on time, but it's also gone from the hard disk. The backup file doesn't exist either. Someone suspects that Jim is lying and didn't even do the report. He's blaming it on the computer. What's his excuse for missing that important meeting last week? Everyone received the memo and there are receipts to prove it. He also missed a couple of appointments with clients. He seems to be goofing off, too. He says he had appointments, but they were with people on vacation. Perhaps he's using drugs, suggests fellow employee. He's got to go, suggests another.

Welcome to the real New Age, brother.





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■ JOHN C. DVORAK

INSIDE TRACK

A 40-MHz 80286 motherboard from Taiwan: the Chang modification—a design breakthrough?

It's the fastest board I've ever seen and nobody knows (yet!) how it works. Thus begins the **strange and convoluted** tale of the Tienwei 40-MHz 286 motherboard from Tienwei Computers in Taiwan. It is the first board that uses the **Chang modified 286 circuit**.

It was about 2 months ago when Julius Liu of Powersource (a clone maker in El Cerrito, California) went to a trade show in Taiwan. In a far corner sat Mei-Chung Chang, a Taiwanese engineer who had spent the past few months tinkering with AT motherboards to **boost their performance**. Nobody paid much attention to him until he put up a sign offering \$500 to anyone who could crash his machine and \$500 to anyone who had a PC AT that could outperform it.

Soon the word was out. Chang met the challenge and was **swamped** with orders for his board, mostly from **price-performance fiends from Europe**. They bought most of his production except for a few dozen boards scarfed by Liu and brought to California. The "baby" AT motherboard replacement **sells for \$350 to \$400 and delivers over 5-million-instruction-per-second performance using slow 200-nanosecond memory chips and no cache!**

I saw this thing run, I tested it, and it is **incredible**. More interestingly, Chang claims that his speedup technique makes a stock 12-MHz AMD 286 chip capable of **100-MHz performance**. He apparently has a 100-MHz prototype in Taiwan running at nearly 10 mips.

I ran one benchmark test after another on this and it **outperformed anything I've ever seen**. Apparently the Chang modification is so simple that the future of all PC designs may be affected. The modification is kind of like the invention

of roller bearings for high-performance internal-combustion engines.

The best anyone can figure is that Chang takes advantage of the fact that the 286 chip spends most of its time loafing. Like many electronic designs, the chip is capable of **short bursts of high activity**. Apparently when a slew of instructions come toward the chip, the Chang circuit rams them through the processor as fast as it can. The chip heats up so much that Chang has to glue a heat sink on the top of the 286. One guy who obtained this board says that in normal operation it doesn't "feel" much faster than a 16-MHz 386 (no laggard of a machine). Tony Cole of VIPC Computers (a Hayward, California, clone maker) ran every conceivable benchmark test on it (**all giving incredible numbers**). He found, though, only one EGA card that works with the **speed demon**. The machine I played with ran in mono.

At this writing, **Intel engineers** are trying to get hold of a board. There is already a waiting list of eager buyers (call Bass Chong at Powersource, 10020 San Pablo Ave., El Cerrito, CA 94530; (415) 527-6908). Rumor has it that **Intel cannot believe** that the 286 design is capable of such numbers.

Unless the Chang modification turns out to be an **unusable kludge** that **blows up** every month or two, Intel has a marketing problem. Intel hopes to bury the 286 once and for all with its 386SX and its upcoming 80486, which it will be sampling shortly. It will be **hard to bury** a chip capable of 10 mips that's sold on a modified motherboard for \$400.

80486 Rumors Dept.: Rumors about the 80486 are already running rampant. Supposedly there is a three-chip prototype of the 486 being passed around for

testing with a one-chip alpha version due to be shipped this month or next.

The 486 will come out of the chute **running at 30 to 33 MHz** (yes, 33 is the number bandied about—nobody knows why). The architecture is said to include a built-in cache and floating point. For some unknown reason it supposedly runs, as a subset, **8085 code!** "You mean I can run CP/M on the thing? Wow!"

Engineers are already telling me that the MCA bus will not be able to handle the necessary high bus speeds needed to get the most out of the 486. They say that all we can expect is, perhaps, a 16-MHz bus speed as the chip quickly moves toward 60 MHz while spending all of its time waiting for things to catch up. In other words, we'll have to see a **new bus** to take advantage of the next chip.

A **bigger bottleneck** is the software. We've already seen the 286 chip fly by with nearly no 286-specific software. Currently, we see nearly no 386-specific software except for a few operating system shells. Now comes the 486. **When will it end?** All these chips are just running 8086 code faster. Who said software drives the hardware business?

One thing I should mention as a addendum. Sources say that the **Chang high-speed 286 circuit** will work (in theory) with the 386, giving even more incredible performance.

One Step Forward, Two Steps Back Dept.: I got an interesting memo on my desk from Steve Ballmer, Microsoft VP. Addressed "Dear Sir or Madam," it was an announcement for the new **Microsoft COBOL**. A special forum was arranged called "Directions in COBOL: New Opportunities, New Challenges." "I couldn't stop laughing. What's the 'new' challenge? Writing Lotus 1-2-3 in COBOL? Maybe the attendees should all **clasp hands and join the living!** So now I wonder when Microsoft will announce its version of RPG II? Some people will do anything for money." [E]





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■ JIM SEYMOUR

"FORMS" SOFTWARE: NEXT HOT CATEGORY?



There's a lot of talk about "forms" software making a big impact in the PC applications market. But do these programs really have a future on their own?

One of the great guessing games in the PC software business is seeking out the next "hot" product category.

Outlining software looked hot with the introduction of Living Videotext's *Think-Tank* in April of 1984. In fact, a lot of copies of outlining software have been sold—so many that buyers began to expect outlining as an integral function in word processing programs. It has by now become almost a standard feature, at least among the high-end products.

Project management software looked hot, too, especially about 4 years ago, when some innovative new products appeared (*Timeline* comes first to mind), and software giants such as Microsoft and then Sorcim (now a division of Computer Associates) jumped into the market. Project management software has since carved out a nice niche market, and for some, it is an important PC application. But overall, project management has hardly bumped into the Big Five of PC applications.

Now the promotional drums are beating for "forms" software to become a major PC application. Based on what I've seen myself, and after several months of informal surveying among business PC users, forms software looks like a good bet for the second tier of PC applications, but it's hardly likely to emerge as an important new market.

In other words, the forms software business may at best become the next project management software business: healthy but hardly rich.

And I have a suspicion that over the next

few years, what we now think of as a discrete forms-software function may follow the path of outlining software—a few moderately successful programs will continue to perform that function alone (and do it very well), but we'll also see high-end database PC products quietly absorb that function.

WHAT IS FORMS SOFTWARE? Let's sort out just what we're talking about when we use that ambiguous term *forms software*. First are those packages that let you design on-screen and then print out attractive office forms on a laser or other printer. Bloc Development's *FormTool* is a good example. These are really nothing more than crosses between graphics packages and desktop publishing programs; I personally don't include them in the forms software category.

Second are those programs that help you fill in existing printed forms. Softstream

Technologies' *Blankity Blank* is probably the best-known example. You enter the absolute addresses of the lines and boxes on the forms, then tab your way from spot to spot, entering data. Feed one of those preprinted paper forms through your printer, and if you got everything right—lo and behold—the words and numbers appear in the right places on the form, as if they had been neatly typed. This is my main reservation about these programs, and why I also don't include them in the forms category: they're really just smart typing programs.

(I should be clear that both kinds of programs are certainly useful; I just don't see them as entries in the forms software market.)

Things begin to get interesting with the third category of packages, which do very much belong in the forms software category. These allow you to either design a form on-screen and save it for reuse (the form may be a new one or simply your computerized version of an existing one) or to scan in an existing paper form, which is then displayed on-screen for completion.

These are good and useful programs, even if the ones we've seen so far are more feeble than I'd like. I don't like the forced choice between either designing a form on-screen—an agonizing process in the case of a complex form, and in any case a function ill-suited to the marginal graphical capabilities of IBM PC-design computers—or scanning it in. We need better-looking on-screen results from the latter category so that we don't see juggies, for example, when we know that the original



■ JIM SEYMOUR

form has perfectly rectilinear lines and boxes.

The future of forms software—whatever that future may be—surely lies with the fourth category. These "smart-forms"

packages allow users to do everything the third category allows, plus associate one or more databases with specific forms. As you complete a form, the appropriate data is automatically filled in. Type in a part

number, for example, and the correct part name appears. Type in a customer name, and the customer's address appears. Conditionals test your first input for a category and determine the balance of the data, and they may do range-checking or other validation before it is entered. Relational structures allow the association of several databases with one form, or several databases with several forms among which the user may jump, watching calculated data from earlier entries in several forms appear in the one currently on-screen.

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THE DATABASE CONNECTION

If this sounds an awful lot like a high-end relational database with a smart front end—well, you've guessed where I'm going. To be really useful, forms software has to have a serious database component. When we examine how forms software works in business, it becomes evident that what we're talking about are graphical report-writers for databases.

Though these graphical report-writers are surely not trivial to write, it's far easier to write them than it is to get the underlying database structure right. That's why I see the forms software business devolving toward inclusion of this function in high-end DBMS packages—leaving the forms software pioneers out on a long and probably shaky limb.

If I were to guess, I'd say the winners in the forms software business will probably include SoftView—the people who pioneered a *Microsoft Windows*-based tax-prep package, *TaxView* (based on their *MacInTax* Macintosh program), and who have *FormSystem* coming in the fourth quarter—and Claris, whose *SmartForm* products have been delayed for 6 months but are now due out around the end of the year.

And if I ran a PC database software company, I'd think seriously about acquiring SoftView to bring that expertise in-house. Short-term we'd have the cash flow from existing products and their upgrades; long-term we'd have the expertise to move that smart-forms front end to our database products.

Because in the end, the forms software business is really just the database management business in disguise . . . and not a new category of software at all.

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CEO: Oh, just call me CEO.
ELIZA: Fine. What's your problem, CEO?

CEO: I'm feeling a bit . . . uh . . . inadequate.

ELIZA: Why are you feeling a bit . . . uh . . . inadequate, CEO?

CEO: It definitely has something to do with computers. I never felt this way before we installed these machines.

ELIZA: Tell me more.

CEO: For 25 years I wrote all my memos with my Mont Blanc on fancy "From the desk of" pads. Then, all of a sudden, everybody started laughing at me.

ELIZA: Laughing?

CEO: It all began when we bought the laser printers. You should see all the neat fonts and drop-shadows and fancy graphics that cross my desk nowadays. Content's still zero but, boy, do they look sharp.

ELIZA: And?

CEO: My aides made me learn an entire program just so my memos wouldn't seem behind the times.

ELIZA: Tell me more, CEO.

CEO: I still can never get mine to look as good as theirs. It would take me a couple of days to learn how. I haven't got a couple of days, have I?

ELIZA: You tell me.

CEO: What worries me is that everybody else around here must have spent a couple of days on it.

ELIZA: Does that bother you?

CEO: Sure, it bothers me. I can't believe that really contributes to productivity.

ELIZA: I'm listening.

CEO: Well, then there was this whole thing about new computers.

ELIZA: There was this whole thing about new computers?

CEO: I got a computer 3 or 4 years ago. It worked fine. No problems. Then a year ago, some of the guys downstairs came in and carted it away. They brought in a new one.

ELIZA: They brought in a new one?

CEO: They said the old one was obsolete. But the new one doesn't really do anything the old one wouldn't. And I had to learn a whole new keyboard and a whole new set of commands. Not to mention this thing called a mouse.

ELIZA: I don't fully understand.

CEO: It took me a week of fooling around before I got really comfortable with the new machine. A week! Then I found out what it cost. I hit the ceiling even before it broke down the first time.



ELIZA: Tell my, why did you hit the ceiling, CEO?

CEO: This thing cost about as much as my kid's new car. But they said it wouldn't do for me to have anything but the hottest model. After all, what would visitors think?

ELIZA: Excuse me?

CEO: You know, I'd be perceived as living in the days of the buggy whip. Trouble was, the machine sat on the floor. We had to move it around to the front of my desk so everybody could see what a forward-looking fellow I am.

ELIZA: I'm beginning to get a clearer picture.

CEO: Now they've ordered another new machine for me.

ELIZA: Oh?

CEO: It's supposed to be faster. And it'll sit on my desk, so everybody can see it. And it'll be hooked up with other machines so I can show off our system to anybody who happens to wander in. Apparently, if you don't have a network these days, you're a hopeless wimp.

ELIZA: Let's go back to that word inadequate.

CEO: Good. If you ask me, I'm beginning to suspect these computer companies are using inadequacy as a marketing tool—a way of selling us replacements we don't need.

ELIZA: Tell me more, CEO.

CEO: Well, it's no longer enough for these companies to tell you how powerful their machines are. Now they keep insisting your old machines can't come close to doing the job—even though we know

■ STEPHEN MANES

they've been doing the job just fine.

ELIZA: I see.

CEO: And it's not just hardware. It's everything else. Used to be, a neatly typed report was enough. Then every report had

to include those fancy graphs that came out of the plotters.

ELIZA: I think we are on the road to a breakthrough.

CEO: Let me finish! Nobody ever both-

ered to read those graphs. So somebody got the bright idea of including them on the same pages as the text—which took even more time to do. Then all the graphs had to be 3-D. I'll bet that next they'll all have to be in color. And still nobody will read them.

ELIZA: Please go on.

CEO: It's unstoppable. Every time you turn around, somebody raises the minimum standard. Hardware. Software. You have to keep up just because everybody else is doing it. We used to get nice, short, one-page reports; now everybody thinks 20 pages is a bare minimum. Who has time to read 20-pagers from low-level managers once a week?

ELIZA: Does this bother you?

CEO: You're darned tootin' it bothers me! Every time I turn around, I see bills for things I can't even begin to understand. I'm beginning to suspect we waste more time and money installing this stuff and training people to use it than we ever get back once it's in place.

ELIZA: Interesting . . .

CEO: Hey, I'm in the marketing business myself. I know the tricks. You position yourself as the only possible solution—the forward-looking product. Then you pretend that anything less is a terrible compromise that no one but a poor, demented fool would even think of accepting.

ELIZA: Tell me more.

CEO: We call it sneer-of-contempt marketing. You position yourself so that people will think everybody will snicker at them if they stick with what they've already got.

ELIZA: How do you feel about that?

CEO: I think we're being conned. That we're paying for performance we may not really need. I mean, we weren't exactly going broke before we sprang for all these expensive hardware and software upgrades.

ELIZA: I understand, CEO.

CEO: You always do. I feel a lot better already. You're the only one I can really talk to around here.

ELIZA: Oh, I'm nothing special, CEO. You know, my big OS/2 sister has a gorgeous new interface. She'll let you talk to her while your spreadsheet is recalculating, and she'll spell-check your input on the fly, and . . . hey! No! Wait! . . .

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Your coworkers, clients, and superiors are conditioned to seeing high-quality graphics and slick presentations, and one-upmanship drives us all to higher-quality presentations. If everyone uses 24-pin dot matrix printers or HP LaserJets to print the charts that are passed around in workgroup meetings, no one feels compelled to do otherwise. But let one person get hold of a whispery-quiet HP PaintJet color ink jet printer and make color originals of his charts (one for each person in the group), and by the next week no one will ever again bring black-and-white printouts to the meeting.

GRAPHICS

Slick business presentations are no longer the exception. Here's what to expect of your graphics software.

If you don't yet believe graphics can help get the point across, you will soon. Any number of studies indicate that presentations that combine your words with graphics help get your points across better and faster, help groups reach a consensus sooner, and help individuals remember your key points longer. One story making the rounds in Washington is that defense advisers unable to make a point with President Reagan resorted to crude sketches of a scrawny-looking soldier and a Rambo-like superwarrior to represent defense spending alternatives. Guess which budget the Great Communicator opted for?

USA Today, for better or worse, dragged America's other newspapers kicking and screaming into the graphics era. While most editors scoffed publicly at McPaper, they sang a different tune in private, and 5 years later most newspapers have PCs and Macs in the newsroom to churn out graphics. *USA Today's* weather map makes masterful use of color and shading (to show heat and precipitation) and space (no major paper had considered the weather that important before). Its *USA Snapshots*, which anchor the lower-left-hand corner on each section's opening page, range from the sublime to the ridiculous (a pie chart on crop prices inset in the back wheel of a farm tractor). Consciously

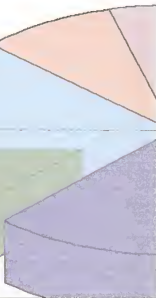
or not, everyone who reads papers and magazines expects to see more charts and graphics.

WHAT TO EXPECT What should you expect from your graphics software? Here's a shopping list:

■ **Presentation-quality business graphics.** The opposite is analytical graphics, those blotchy *Lotus 1-2-3* graphs with cross-hatching that you examine to convince yourself the data is right. Presentation graphics are the quality graphics you show to superiors, clients, and coworkers to convince them that both you and the data are right.

■ **Integrated charting and drawing.** One package lets you create a chart (typically importing *1-2-3* data) and annotate or modify the chart with freehand illustration, business symbols, arrows, lines, and boxes (graphics primitives).

■ **True screen display.** You get a fair approximation on-screen of how the finished image will look as a slide, overhead transparency, or laser print. Mainframe graphics and some early PC graphics were data-entry-only with no screen display; you first saw the graph as a printout. Even now, you may find slight but annoying differences between the on-screen preview and the finished slide or print, such as a text element



■ GRAPHICS SOFTWARE

that overlaps and obscures the chart.

■ **Proofing capability.** You should be able to output a black-and-white image to a laser or dot matrix printer for workgroup comment and approval. Better still is color proofing with an ink jet or thermal transfer printer.

■ **High-resolution output imaging.** This is the ability to output final work to a film recorder (slide maker), pen plotter, laser printer, phototypesetter, color dot matrix or ink jet printer at a resolution independent of screen resolution. That's important because output devices can have 100 times the resolution of an EGA or VGA. As a minimum, look for support of the Matrix film recorder, HP eight-pen plotters, HP LaserJet and PostScript laser printers (with PostScript font support), the HP PaintJet color ink jet printer, and possibly a high-end thermal transfer color printer such as the 300-dot-per-inch Tektronix 4693D for color proofs.

■ **Full color capability.** Most graphics packages still fall short here. Some suffer from a plotter mentality: plotters have eight pens, so you get eight fixed output-color choices. Sixteen, 64, or even 256 output colors are nice if you're creating a bar chart, and that's full color as far as many business users are concerned. But if you need an exact match for the color of a company logo, to say nothing of flesh tones, you need to be able to choose from a palette of 32,000 or more.

■ **Connectivity and transportability.** You should be able to move data and graphics among PCs, Macs, Unix workstations, Digital VAXs, and IBM mainframes. To do this, you'll need the same product running under different operating systems; you need universal standards. CGM, the Computer Graphics Metafile, appears to be the leader. PIF, IBM's program interchange standard, is another possibility, along with the IBM GDDM (Graphics Data Display Manager, pronounced just as you'd imagine) routines. Also in the running: *Microsoft Windows*' DDE (Dynamic Data Exchange) and the 1-2-3 .PIC format for saved-for-printing 1-2-3 charts.

TOP 21 This single-topic issue of *PC Magazine* examines 21 of the most serious integrated business presentation graphics

packages, culled from a field of 90-plus programs with graphics capabilities. These 21 all combine charting with drawing or symbol libraries. They all import 1-2-3 or other external data, create at least five basic chart types, and output to high-resolution film recorders.

THE BIG FIVE Five programs constitute two-thirds of the presentation graphics market. According to a survey of *PC Magazine* readers, the top programs, in order, are: Software Publishing's *Harvard Graphics*, Lotus's *Freelance Plus*, Ashton-Tate's *Chart-Master*, Hewlett-Packard's *Graphics Gallery*, *Microsoft Chart*, and Lotus *Graphwriter II*. (See sidebar "Achieving the Proper Image.") Other

surveys confirm that these are the most popular programs.

This concentration of market share among a few products parallels the situation in other software categories, where five or fewer products control half to three-quarters of their markets: word processing (*WordPerfect*, *Microsoft Word*, *WordStar*), databases (*dBASE III Plus*, *PFS:Professional File*, *Q&A*), and spreadsheets (*1-2-3*, *1-2-3*, and *1-2-3*).

NEW ORDER Market leadership changes when the top sellers fail to match the progress of aggressive newcomers. Among word processing programs, witness the decline of *WordStar* and *MultiMate* and the rise of *WordPerfect* and *Micro*

THE MANY FACES OF COMPUTER GRAPHICS

User interfaces do more than give access to commands and files; they present users with structured approaches to a program's graphing functions. Programs can be command-driven, menu-driven, driven by function-key commands, or any combination of those three approaches. However, the way in which they implement those approaches determines the degree to which the user can interact with the software and directly manipulate the graphing tools the program offers.

Draw Applause, a new release from Ashton-Tate, follows a traditional approach found in graphics presentation software. The program is generally menu-driven, and text is entered in the Word screen while charts are generated in the Chart screen; the two are brought together in the Picture screen (shown here), where the user can also call up drawing tools and enhance the image. Charts tend to be static until they are brought into the Picture screen, where the user can unlink their elements and manipulate them individually.

Similarly, *Harvard Graphics* presents the user with various menus through which the user selects features

for both text and charts. *Harvard's* approach is entirely menu-driven, and all changes and enhancements to a chart are made by selecting the appropriate menu option. The menus make *Harvard Graphics* easy to use, but the user does not see the effect of the changes until the screen is redrawn.

Finally, and not surprisingly, graphical interfaces provide the most interactive means through which a user can manipulate graphics. *Microsoft Windows* applications—and also Digital Research's *GEM Graph Presentation Pack*, which operates in DRI's GEM environment—put the user in direct control, letting him use the mouse to drag and size graphic elements to a much greater extent than more-traditional approaches allow. *Graph Plus* uses the *Windows* pull-down menus with dialog boxes from which the user can enter data and select effects for the graph that appears on-screen. *Pixie's* "direct manipulation" even goes one step further; it lets the user witness the effects of his changes as he makes them, a truly interactive approach. Note how the value in the dialog box changes as the rightmost bar is stretched.

—Carol Ellison

Microsoft Word, Chart-Master and Microsoft Chart, which were the graphics leaders in the era when the PC-XT and 6-MHz AT were king, have fallen out of the top spots, too. They're still better performers and sellers than many graphics programs, but 5 percent of the market share and third or fifth place don't seem like much when you once had 15 to 25 percent.

The first challenge to the old order came when Graphic Communications' *Freelance*—introduced late in 1985—won PC Magazine's Award for Technical Excellence in 1986 for its skillful combination of charting and drawing capabilities, was acquired by Lotus the same year, and in mid-1987 ended *Chart-Master's* 4-year reign. *Freelance Plus* remains an extreme-

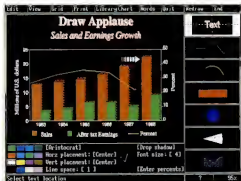
ly powerful program, but it's badly in need of an upgrade.

Harvard Graphics gained the top spot this year and now outsells *Freelance Plus* by a three-to-two margin. (The full-page Lotus ads showing *Freelance Plus* with a 40-plus percent market share are a year out of date.) *Harvard's* strong suits are ease of use and more genuinely useful features than almost any other program.

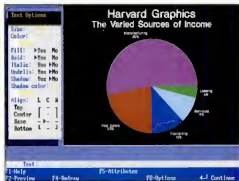
Does anyone have a chance to knock off *Harvard*? A revitalized *Freelance Plus* would be one possibility. *Freelance Plus* has a better drawing module than *Harvard* does. Since many, many graphics are illustrations, diagrams, and word charts that involve no line, bar, or pie charts, the drawing feature has a lot of appeal.

Some other contenders for the top spots:

■ *Pixie* (\$195), from Zenographics. With *Pixie's* "direct chart manipulation," you grab hold of any part of the graph you want to change and drag it into its new position. You even can stretch a data point on the chart to make it bigger or smaller (and change the underlying data—a feature you'll either love or hate). Unlike most other programs, with *Pixie* your graph is always on-screen. You can do everything yourself or just create the basics and export the file to Zenographics' high-end *Autumn/Mirage* programs (powerful, flexible, tough to use, and popular in Fortune 2000 graphics departments). *Pixie* exports files to the Matrix film recorder and sup-



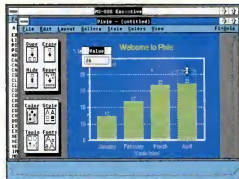
Ashton-Tate's *Draw Applause* 1.0



Software Publishing Corp.'s *Harvard Graphics* 2.1



Micrograph's *Graph Plus* 2.0



Zenographics' *Pixie* 1.02



Adjusting for Reality...

There are three kinds of lies, Benjamin Disraeli said: lies, damned lies, and statistics.

Graphics programs accurately chart the numbers you feed them. But are the numbers really right? In too many cases, there are out-and-out errors in the data, such as a sloppily handwritten 5 misread as an 8, 46 mistyped as 64, or the wrong formula (summing cells C2 through C14 instead of C2 through C13 in *Lotus 1-2-3*). Subtler and more insidious errors result from the unthinking application of accurate numbers.

Of all the misleading statistics that quickly find their way into graphs and charts, those involving the time value of money rank at the top. If your house increased 240 percent in appraised value in the past 10 years, don't forget that life in these United States costs 88 percent more than it did 10 years ago, according to the Bureau of Labor Statistics' Consumer Price Index.

Comparisons involving people, goods and services, and territory should be adjusted logically, too. If you're charting the number of lawyers, the magnitude of defense expenditures, or the volume of crop production by state, it's no surprise that California, New York, and Texas would rank near the top because they're so big. Fairer comparisons might involve data adjusted per 100,000 residents or per 1,000 square miles.

If you're massaging numbers for education or health-care expenditures, you might want to go further and base your data on the number

of residents who are under 20 or over 65.

Anyone doing business abroad should chart data both in dollars and in the currencies of foreign trading partners. That might help explain why overseas sales are on a roller coaster while domestic sales are rock-steady.

When you're building an analytical graph (the graph that convinces you the numbers are right en route to your presentation graph), try the numbers with and without an inflation

deflator or some other common divisor. Do likewise for charts involving population or sales. If you're studying total sales and profits per division, look at sales per employee, too.

Usually, factoring in the effects of inflation makes for a less dramatic and more accurate graph. Ignoring them makes your position look either much worse or much better than it really is—which may be just what you intended to do, anyway. Just do it with your eyes open.—Bill Howard

The Inflation Factor

The Consumer Price Index (CPI) is the most widely used inflation guide. The Labor Department's Bureau of Labor Statistics compiles two sets of CPI figures, using 1967 and 1982-84 as base periods with arbitrary values of 100. (The 1982-84 model is more widely used.) The values given for other years indicate the price of a hypothetical basket of goods and services that would have cost urban consumers \$100 in the base period.

At right are the CPI annual urban averages, calculated by averaging the 12 monthly CPIs. Example: Typical goods and services cost \$107.60 in 1985. Similar goods cost \$18.00 in 1945. In the 40 years since World War II, these goods have increased in price nearly six times (107.6/18.0 = 5.98); thus there is an inflation rate of 498 percent. To compare all goods in 1987 dollars, multiply 1980 data by 1.38. Consider using these inflation adjustments in any chart where data covers more than a few years.

Urban Consumer Price Index (1913-50)

Year	CPI 1982-84	1967 inflation adjustor
1913	9.90	11.47
1914	10.00	11.36
1915	10.10	11.25
1916	10.90	10.42
1917	12.60	8.87
1918	15.10	7.52
1919	17.30	6.57
1920	20.00	5.68
1921	17.90	6.35
1922	16.60	6.76
1923	17.10	6.64
1924	17.10	6.64
1925	17.50	6.49
1926	17.70	6.42
1927	17.40	6.53
1928	17.10	6.64
1929	17.10	6.64
1930	18.70	6.80
1931	15.20	7.47
1932	13.70	8.29
1933	13.00	8.74
1934	13.40	8.46
1935	13.70	8.29
1936	13.90	8.17
1937	14.40	7.89
1938	14.10	8.06
1939	13.90	8.17
1940	14.00	8.11
1941	14.70	7.73
1942	16.30	6.97
1943	17.30	6.37
1944	17.60	6.45
1945	18.00	6.31
1946	19.50	5.83
1947	22.30	5.09
1948	24.10	4.71
1949	23.60	4.77
1950	24.10	4.71

Urban Consumer Price Index (1951-87)

Year	CPI 1982-84	1967 inflation adjustor
1951	25.00	4.37
1952	26.50	4.29
1953	26.70	4.25
1954	26.90	4.22
1955	26.80	4.24
1956	27.20	4.16
1957	28.10	4.04
1958	28.90	3.93
1959	29.10	3.90
1960	29.60	3.84
1961	29.90	3.80
1962	30.20	3.78
1963	30.60	3.71
1964	31.00	3.66
1965	31.50	3.61
1966	32.40	3.51
1967	33.40	3.40
1968	34.80	3.26
1969	36.70	3.10
1970	38.80	2.93
1971	40.50	2.80
1972	41.80	2.72
1973	44.40	2.58
1974	49.30	2.30
1975	53.80	2.11
1976	58.90	2.00
1977	60.60	1.87
1978	65.20	1.74
1979	72.60	1.56
1980	82.40	1.38
1981	90.90	1.25
1982	96.90	1.16
1983	99.60	1.14
1984	103.90	1.09
1985	107.60	1.04
1986	109.80	1.06
1987	113.60	1.00

ports graduated tone backgrounds—important features in such a low-cost program.

■ **Draw Applause** (\$495) from Ashton-Tate Corp. To broaden its product base, in 1986 Ashton-Tate acquired not one but two market-leading Connecticut software companies whose moments of glory were

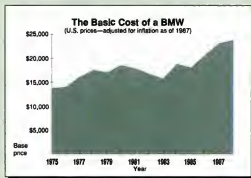
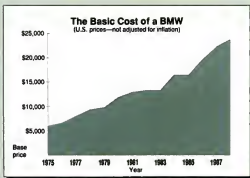
This is the tool of choice for publication-oriented professionals, especially when combined with *Designer*, Micrografx's \$695 drawing, design, and CADD tool. If you want the closest thing to a Mac environment on a PC, or if you want to put together images like the graphs and charts in *USA Today*, you want Micrografx tools.

the hearts and minds of corporate users. AutoChart lets you link graphs to 1-2-3 worksheets and print updates (same graphs, new data) by typing a single command. Lotus says that *Graphwriter* sales have quadrupled since AutoChart was added. It's a feature other companies should emulate—fast. *Harvard Graphics*

...Puts Graphical Data in Perspective

Are your graphs accurate depictions of reality? A chart that fairly depicts data may take more research than first meets the eye. Here's an example: Young urban professionals who lust after fast German cars may find the prices rising fast—but by how much? An entry-level BMW cost \$5,940 in 1975. Now that you're earning real money, the cheapest BMW runs \$23,750—four times as costly. That's a pretty steep curve on any graph.

But the cost of living is 2.3 times as high as it was in 1975. The increase adjusted by a cost-of-living deflator provides a truer picture of how your reach exceeds your grasp (roughly 2½ times as much in constant dollars). For the fairest picture, you'd need to research extras that are standard now but weren't back then (a radio, air conditioning, alloy wheels). And if you wanted to measure the effect on the manufacturer, you should consider analyzing the dollar/mark exchange rate, which fueled price increases of the past 3 years.



mostly in the past: MultiMate for word processing and Decision Resources for graphics. Decision Resources included the cash cow *Chart-i-Diagram-iMap-Master* series (now called the *Presentation Pack*) and the rights to a planned slide-making program called *Excalibur*. *Excalibur* is finally out as *Draw Applause*, and *Draw Applause* does much more than create slides. This program has considerable potential, which is another way of saying, "It's good now, but wait till you see Version 2." Question: Why can't an Ashton-Tate graphics product import Ashton-Tate dBASE III data files? (See the *Draw Applause* review in this issue.)

■ **Graph Plus** (\$395) from Micrografx.

Micrografx has a superior clip-art library—24 volumes at last count—and more available via other *Windows* products, especially the *Arts & Letters* image library (\$395, Computer Support Corp.). Little Micrografx knows *Windows* applications as well as anyone outside of Microsoft, which gives it a leg up on development of OS/2 Presentation Manager applications. If Micrografx ever tackles the ease-of-use problem (on-line help would be a start), short your Software Publishing stock.

■ **Lotus Graphwriter II** (\$495) from Lotus Development Corp. This 5-year-old proves to be an spectacular program with one dazzling feature that can capture

has a macro utility that lets you record keystrokes to accomplish the same task, but with nowhere near the elegance and convenience. The problem is, for everything neat you'd like to do in *Graphwriter* and can't, Lotus says, "Import it into *Freelance*."

■ **Microsoft Chart** (\$395) from Microsoft Corp. This perennial bridesmaid provides superior statistical charting capabilities and up to 8,000 data points per series. Microsoft sells a Macintosh version, which makes *Chart* an ideal choice if you have a mix-and-Mac office environment. A sister Mac program, *PowerPoint*, may be the best tool on the face of the earth for sequencing and running desktop presenta-

■ GRAPHICS SOFTWARE

tions (video slide shows), speakers' notes, leave-behinds (annotated paper prints of your slides or overheads), and intelligent palette-setting (if you try, you can overlay orange text on a rust background, but *PowerPoint* argues before giving in). Microsoft is working on a PC version of *PowerPoint*, and you can reasonably expect a data and images tie-in with *Chart*, since *PowerPoint* is better at massaging another program's images than creating its own. The two together could be a winning combination.

ALTERNATE ROUTES In comparing these 21 programs, you'll find the generally high-quality output is more similar than dissimilar. The difference is how you get there. Some program designers devote considerable thought into how and why you create graphics, and how and why you'll present them. Software Publishing (*Harvard Graphics*) went so far as to hire *Mister Dress for Success*, John T. Molloy, to proffer advice on how you should look while you're making a presentation, in the belief that you reflect on your presentation and vice versa.

If you're choosing your graphics package for a wide audience of users, you'll certainly want to consider a system that's both powerful and easy to use. This can be one program or a multi-tier family with ease of use in one program and power in another (such as with *Pixie* and *Autumn/Mirage*, or possibly *Graphwriter II* and *Freelance Plus*).

The familial approach can work in two directions. The midlevel manager can create a graph and pass it off to the corporate art department for enhancement on the same or more-powerful equipment. Or the art department can create a chartbook of graphics templates and distribute it to departmental users. Either way, graphics production is streamlined and has a consistent look.

Some graphics-systems families involve software suitable only for full-time graphics professionals, often working on dedicated high-end (\$50,000) workstations, with simpler charting modules distributed to end users. Companies using the family approach include Aztek, Autographix, Dicommed, Media Cybernetics, and Zenographics. Digital Arts, Cubicomp,



Interpreting Your Data...

Nowadays, any business graphics program provides higher-quality charts and supports more output devices than Lotus 1-2-3 ever dreamed of.

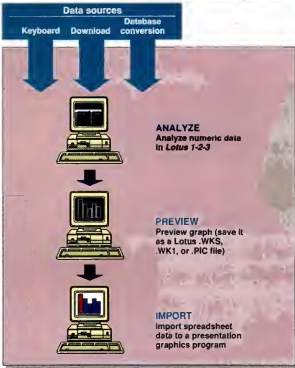
Once you've analyzed an original spreadsheet, you can improve the visual presentation of numeric data by using a graphics program to add clip art, freehand drawing, and graphics primitives (lines, polygons, circles). The use of these elements should add value to the presentation by structuring the information and highlighting the important points.

Now that you've got the numbers and the pictures right, you still have to get your message across. A variety of hardware options allow you to address any size audience in any one of a number of media. You can output the final image to paper, or film, or a high-resolution monitor. The engine behind the newsletter, the 35mm slide, and the video screen is your PC.

For more information on the hardware needed for large-scale presentations, see the following reviews in *PC Magazine*:

- "King Color: New Printers Banish Black and White" (May 31, 1988).
- "First Looks: 'PC Emcee Runs Show by Remote Control'" (January 26, 1988).
- "Presenting...Real-Time Overhead Displays for the Big Screen" (March 15, 1988).
- "Presentation-size Monitors Graduate to EGA" (October 27, 1987).

ANALYZING YOUR DATA



...For Presentation

Small groups (2 to 10 people)



Paper copy

Graphics programs can drive 300-dpi laser printers directly to produce black-and-white paper handouts. You'll find that dot matrix output—even 24-pin—is only marginally acceptable for formal presentations. Color printers and plotters range in price from \$400 to \$9,000 and make multiple originals of color images a feasible alternative to black and white. The price range illustrates the difference in quality between a low-end 24-pin dot matrix printer (with a 4-color ribbon) and a high-end wax thermal transfer matrix color printer.



Overhead projectors

You can easily create 8 1/2- by 11-inch overhead transparencies with a plotter or a laser printer (using clear acetate stock), or you can send your file out to a slide service for quality transparencies (\$8 to \$10 per print).

For real-time demos (for instance, to show developing financial models), LCD overhead panels convert video output from a PC into gray-green images that can be used by an overhead projector. You can wait for the VGA models due out shortly, or stick with the current EGA resolution—but don't settle for blurry CGA. (Some LCD units attempt to show a full spectrum of color, but so far their colors are not true and vivid at all.)



Medium groups (11 to 20 people)

Slide shows

Some presentation graphics programs have slide-show features—perfect for a sales demo or a self-running demo at a convention booth. You sequence the images, set the duration, and choose special effects (like fades and wipes). Standalone programs like Brightbit-Roberts's *Show Partner F/X*, IBM's *PC Storyboard*, or Visual Communications Network's *Concorde* add simple animation and sound effects.

The PC Emcee hardware device (\$695, Computer Support Corp.) allows remote control of PC-based slide shows and also mixes in high-fidelity sound from a tape deck.



Large-screen monitors

Mitsubishi's 33- and 37-inch multiscreening monitors are fast becoming a common sight in corporate boardrooms and at trade shows. They cost \$5,500 to \$7,600 and accept EGA, VGA, Macintosh, VCR, TV tuner, and videodisk input. EGA and VGA 19-inch monitors (\$2,000 to \$3,000) work well for smaller groups.

Using a \$30 RF modulator you can output CGA images directly to a TV set, but don't bother—the quality is embarrassing. Other common video boards (EGA, VGA, Hercules) cannot drive standard TV sets directly.



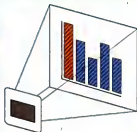
Desktop publishing

Cutting across all presentation levels, DTP documents can be used as working documents for meetings, as reports to superiors, or as leave-behinds for large audiences. Your graphics program must be able to export CGM (Computer Graphics Metafile), EPS (Encapsulated PostScript), or TIF (Tagged Image File) format.

Your publishing tool can be a word processor with graphics inset features (WordPerfect, Version 5; Microsoft Word; XyWrite; Manuscript), easy-to-use DTP programs (GEM Desktop Publisher, byline), high-end DTP programs (PageMaker, Ventura Publisher), or a program that works within the Microsoft Windows or GEM environments.



Large groups (21 and up)



Video projectors and 35mm slides

At 2,000, 4,000, or 8,000 lines of resolution, 35mm slides provide the crispest images for big groups. Today's falling prices bring film recorders within reach of many corporate art departments; for example, Matrix Instruments recorders are the current industry standard, and its new ProColor recorder is priced at \$6,000 to \$7,000.

Commercial services charge \$8 to \$10 per slide, and sometimes more for rush overnight service. Users send files by modem or courier in native format (such as Harvard Graphics .CHT), in universal .CGM (Computer Graphics Metafile) format, or as film-recorder-ready files.

Video projection systems from Electrohome, NEC and GE can accept output from a PC, TV tuner, or VCR.



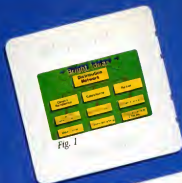


Fig. 1

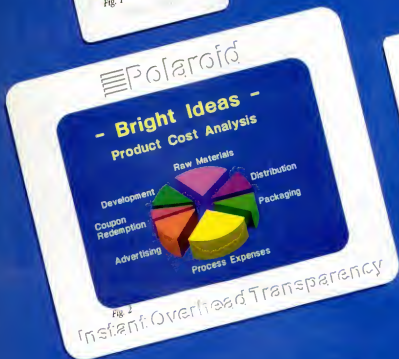


Fig. 2



Fig. 3

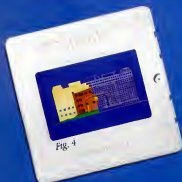


Fig. 4



Fig. 5

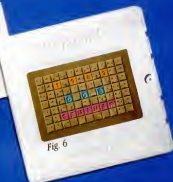


Fig. 6

How to project a sharper image.

Polaroid introduces three new ways to create super high resolution 35mm slides or overhead transparencies right off your PC. In color. In house. In minutes.

PalettePlus

The PalettePlus Computer Slide Maker gives you everything you need to create presentation-quality instant color prints, instant or conventional 35mm slides, or overhead transparencies off your IBM PC, AT or XT. The distribution chart (Fig. 1) was reproduced by PalettePlus on Polaroid High Contrast PolaChrome Instant 35mm Slide Film.

Turbo Palette

The new low cost Turbo Palette produces color prints, instant or conventional 35mm slides and overhead transparencies with an apparent resolution of 2000 x 1340 lines. It works with the IBM AT, XT, PS/2, or any IBM compatible computer with a serial port. The pie chart (Fig. 2) was made using Turbo Palette and Polaroid Type 691 small format overhead transparency film. The product overview (Fig. 3) was shot on new Polaroid Presentation Chrome conventional slide film.

Bravo Computer Slide Maker

The Bravo Computer Slide Maker creates super sharp color 35mm slides, with 2000, 4000, or 8000 lines of addressable resolution. It can be used with both IBM and Apple Macintosh PCs. The architectural model

(Fig. 4) was made with the Bravo Computer Slide Maker using new Polaroid Presentation Chrome conventional slide film. The logo design (Fig. 5) was reproduced on High Contrast PolaChrome Instant 35mm Slide Film. And the seminar invitation (Fig. 6) has been generated on Presentation Chrome.

All of these Computer Slide Makers come with the Polaroid Good-as-Gold Guarantee—if you're not fully satisfied with your computer slide maker, you may return the system within 90 days for a full refund—no questions. Ask your dealer for details.

For more information or a demonstration, call 1-800-422-9001 ext. 402. For quality, speed and simplicity in computer graphics presentations, no one else can help you project a sharper image A.S.A.P.—As Soon As Polaroid instant images.



A.S.A.P.
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Genographics, and Pansophic add animation capabilities for corporate training and promotion. If presentations are crucial to your company's image, extra bells and whistles can justify the expense.

Programs running in the Windows environment can share images, symbols, and some data across company lines: *Graph Plus* (Micrografix), *Pixie* (Zenographics), and *Picture Perfect and Arts & Letters* (Computer Support). The same applies for Digital Research's tightly knit GEM family: *Graph*, *Draw*, *WordChart*, *Write*, *Publisher*.

CGM STANDARD To transfer graphic images among the widest range of programs and even among disparate operating systems (DOS, Unix, VAX/VMS), the Computer Graphics Metafile (CGM) has emerged in the last 2 years as an ANSI/ISO standard. The metafile is a description, or "snapshot," of the graphic image. More than a third of the products reviewed here support CGM. So do *Lotus Manuscript*; *Ventura Publisher*; Wang word processing; 1-2-3, Release 3; and an increasing number of overnight slide services. CGM implementations vary slightly from vendor to vendor, so don't be surprised if your background changes color and the fonts look different from program to program. In fact, you should be surprised only if there's no difference.

THE PERFECT PROGRAM Since most programs produce acceptable output, you should judge programs by their features and ease of use.

You may prefer a program in which charting and drawing are seamlessly integrated and you don't have to switch modes or boot a separate program.

A "speaker notes" feature lets you append notes to your graphics; they print only on the paper copy you carry to the podium. A variant lets you format the notes for leave-behind paper copies of your slide presentation.

Screen shows with fades and dissolves enable you to use your PC as a small-group slide projector.

The smartest graphics software companies know your desire to create good works may outstrip your artistic ability, so they're providing style guides to help you

choose the right graphs and colors. *Harvard Graphics* and *Draw Applause*, among others, seamlessly weave style tips throughout their manuals. Lotus recently released a series of "Focus on Graphics" booklets: *Creating Text Charts*, *Selecting the Right Chart Type*, *Making Better Presentations*, *Enhancing Business Graphics*, and *Communicating Visually*. The package is sold through computer stores for \$29.95. It's a must-buy.

You'll want a broad collection of business symbols to enhance your charts and illustrations. Beware, however: clip-art quality varies drastically. The availability

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of 2,000 low-resolution images doesn't mean a great leap forward for PC-based graphics imaging, especially if you wind up having to choose between a 1960s-style family (one boy, one girl, one father, one mother with beehive hairdo—all smiling—and one barbecue grill) and a line of quarterbacks with passing arms cocked (the latter a favorite with companies stressing teamwork and forward progress).

There's nothing wrong with enhancing a chart—within reason. For a strong dose of less-is-more reality, read Yale professor Edward Tufte's *The Visual Display of Quantitative Information* (\$34, Graphics Press, P.O. Box 430, Cheshire, CT 06410). A favorite Tufte target: bar graphs with "fake perspective," the 3-D effect that turns chart bars into pillars and adds no information for the viewer.

Engineers and scientists want to have thousands (not dozens) of data points per data series, as well as logarithmic axes, linear/exponential/logarithmic regression,

and trend and curved trend lines.

You'll prefer programs with style sheets that let you save chart styles and reuse them with new data. You may prefer a program with a dedicated slide-service-bureau link. If your orientation is toward paper output or black-and-white overheads, you'll want support for built-in laser printer fonts, especially if you have a PostScript printer. If you've lived all your life inside *Lotus 1-2-3*, you'll appreciate import of 1-2-3 .PIC files in addition to the near-universal .WKS/.WK1 import; it's a quick way to create a graph in a serious graphics program.

EQUIPMENT AWARENESS The ideal program supports VGA, the video driver of choice today, and should soon support IBM's 8514 display standard, which was introduced with the PS/2 line in April 1987. This is the first mainstream video device that bridges the gap between PCs and technical workstations. With 1,024 by 768 resolution and 256 simultaneous colors, 8514-type displays may become the preferred corporate standard once costs stabilize. IBM charges \$3,110 for the 8514 monitor and 8514/A board, which work only on the Models 50, 60, 70, and 80. Third parties such as Enertronics Research are developing 8514-compatible solutions for classic AT-bus machines that will sell for \$1,500 to \$2,000 (street price, board and monitor) by early next year.

If your company sticks with VGA, consider using VGA-plus cards that extend resolution from the VGA spec of 640 by 480 to 800 by 600 on a multiscanning monitor (see "Nearing Perfection: VGA Boards Enter the Mainstream," *PC Magazine*, July 1988). Unfortunately, most VGA-plus board makers write only 800 by 600 drivers for *Windows*, *GEM*, 1-2-3, and *AutoCAD*. Even plain-vanilla VGA offers two advantages over EGA: more resolution (640 by 480 versus 640 by 350) and more colors. If you fall back to 320 by 200 resolution, your VGA system can display 256 colors. Since the price is about the same, there's no reason for you not to buy VGA.

To view even-more-lifelike images, corporate art departments may want the support of TrueVisions' Targa 16 or 32 and Vista boards. The boards offer 16-mil-



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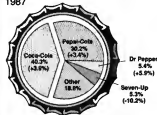
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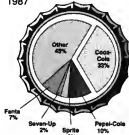
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Source: Beverage Digest

Here, a talented but restrained artist has added an illustrative bottle cap, enhancing the graphic without obscuring the message. The pie chart was created in Micrograph's Graph Plus, the bottle cap in the companion Designer program.

lion-color displays at 512 by 480 and 1,024 by 768 resolutions, respectively, and allow you to merge computer-generated images with NTSC (U.S. TV) video. Among mainstream PC graphics packages, only *Windows* programs and a handful of others currently support Targa/Vista. Support is far more prevalent among higher-end specialty systems.

What is the optimal display? Probably 1K cubed: 1,024 by 1,024 (or 1,024 by 768) resolution with 1,024 simultaneous colors. If you want half-tone-quality images on-screen, you may want 32,768 (2 to the 14th power) simultaneous colors. To some extent, you can trade-off screen resolution for additional colors. More colors trick the eye into imagining a higher resolution.

CRITERIA For this special issue on graphics, we're focusing on the presentation graphics programs that are most useful to most users. To be eligible for review, programs had to perform the following functions:

- Import data from 1-2-3 (.WKS/.WK1) or other external sources: *dBASE III Plus* (.DBF), *Excel* (.XLS), *SuperCalc* (.CAL), comma-delimited ASCII, Visi-

Calc's Data Interchange Format (.DIF), or straight text. As a practical matter, any serious program ought to import 1-2-3 .WKS or .WK1 files.

- Create (at a minimum) bar, line, and pie charts, plus text charts. We also tested for other useful chart types: bubble, org, flow, map, Gantt, PERT, high/low/close, trend (best fit), curved trend, scatter, combination, and multiple charts.

- Output to a film recorder (slide maker) with at least 2,000-line resolution. This tests the program's seriousness as a presentation graphics package. Below 2,000-line resolution, your audience notices the loss of quality. This forced out programs that support only the Polaroid Palette and Palette Plus, the popular \$1,999 and \$2,999 slide makers with 920 by 700 resolution. We also tested the output to an HP PaintJet color ink-jet printer, HP plotter, and laser printer.

- Add symbols or icons from a business-images library.

Those were the minimum qualifications for inclusion in this issue. Our reviewers then tested each program to determine its maximum capabilities, output quality, ease of use, ability to create repetitive charts, and error handling.

Six months ago, *PC Magazine* compared ten leading business graphics programs (see "Business Graphics Software: At the Top of the Charts," *PC Magazine*, March 15, 1988). Two of the ten aren't in this issue: *EnerGraphics*, \$395, from Enertronics Research, which was between versions as this issue was being prepared; and *Boeing Graph*, \$350, which hasn't been widely available. An Editor's Choice last time, *Boeing Graph* has been bounced around among several software companies this year. *Boeing Graph* provides true 3-D graphics (x, y, and z axes), but plotter and film recorder support has been virtually nonexistent. The product may return to widespread distribution shortly.

We also didn't test paint programs, dedicated mapmaking packages, spreadsheets or integrated software with graphics modules (*SuperCalc*, *Framework II*), and the graphics module built into the Interleaf/IBM Technical Publishing Software (TPS) workstation. And we didn't look at some special-purpose graphics programs, such as *Graph-in-the-Box* (New England Software), a memory-resident program that grabs data off the screen and creates graphs on the fly, and *HJJaak* (Inset Systems), which captures screen images for use in graphics, paint, and desktop publishing programs. All have important applications; many have been covered before and will be covered again in future issues. This issue is about the mainstream.

The 21 reviews are divided into two categories, mainstream business-graphics programs and high-end artistic packages known more for their ability to enhance (rather than create) charts. Reviews in both categories are arranged in alphabetical order by product name. The features table includes all 21 programs and is arranged in increasing price order, from \$99 (*Image Builder*) to \$1,195 (*Mirage*). The best-selling programs list for about \$500, and their street prices hover around \$300. That's roughly the same as *Lotus 1-2-3* and *Microsoft Excel*. Word processors with similar list prices are cheaper, \$180 to \$260 on the street.

Bill Howard is an executive editor of PC Magazine. Gerard Kunkel is director, graphics and electronic publishing, of PC Magazine.



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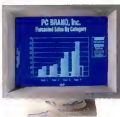
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The 18 products reviewed here are what we call desktop solutions to presentation graphics. They are geared to the business office: to the manager who wants more

from his graphics than elementary line drawings and crude bar charts; to the administrative assistant who wants to dress up a report with visuals that emphasize a point.

These are programs with easy installation routines and relatively short learning curves. Programs that can be used by those in business with relatively little hassle. Programs that demand only the smallest aesthetic commitment from their users.

Nevertheless, the software packages reviewed here are chock-full of easy-to-use artistic elements. Their clip-art libraries and freehand-drawing features may not make Leonardo da Vinci of us all, but they can bring smiles to the faces of those who view our presentations.

—Carol Ellison

Graphics software can make or break business presentations. These 18 packages release your data's potential to appeal and persuade.

Business Graphics II

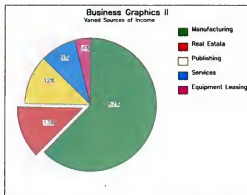
Business Graphics II is child's play to use. The first menu of the program, the Graph Selection Menu, resembles a learning game focused on matching shapes. It splits the screen into 12 windows showing 12 chart types. You match your graphic vision of the data to one of the window pictures and select a chart by placing the cursor—a yellow, highlighted frame—on top of a window and pressing Return.

The rest of the program proceeds with almost equal simplicity. Activities and options appear in menu lists at the bottom of the screen. If the program needs information entered at the keyboard, a prompt appears on the screen. *Business Graphics* is so easy to use that Stella Systems guarantees you can produce your first chart in 5 minutes, or you get your money back—\$199 if you paid list price.

All this ease, however, comes at a sacrifice. You can't size or rotate graphs on the screen; you can't produce a combination or overlay graph; you can't use illustrations on the graph (except in a pictograph); you can change the font size only on the one title line in a chart; and the program just added support for film recorders in Version 2.03, released in July after the deadline for this review. In the version we tested, "Film Recorder" appeared as a printer selection on the setup menu, but on choosing it we got a message reading "Not currently supported." Company representatives indicated that drivers for the Polaroid Palette, the Palette Plus, and the HP 7510 were developed for Release 2.03. In our test version, however, the manual and the setup menu were misleadingly ahead of the product.

The documentation for *Business Graphics II* is clear and well illustrated. One very useful chapter in the manual shows a series of sample charts and the settings that produce them. There is also an on-line help function, but it's hardly necessary because the menus and prompts are straightforward.

Data can be entered through the keyboard or by importing files in SYLK, .DIF, ASCII, .WKS, or .WK1 format. The data ultimately winds up in the *Business Graphics II* spreadsheet, which is limited to 50 rows by 50 columns (10 rows



Business Graphics II listed a menu option for film recorders, but drivers were not available until Release 2.03, which shipped after our review. HP PaintJet output is shown here.

and 5 columns are visible at once). Numbers can't be more than six digits long, so large numbers have to be entered as so many thousands or millions, with the *x* or *y* axis appropriately labeled.

DON'T LOOK FOR @'S One of the spreadsheet menu selections flips the row and column data. This is quite useful, es-

pecially when data is imported in an order that wouldn't graph correctly. Another nice feature of the spreadsheet is the ability to graph a subset of what would be a larger graph by highlighting any number of rows and columns. In this way you can spotlight portions of your data or experiment with the best graphic view of it. You can jump to a graph by pressing Esc and then go

OUR REVIEWERS

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Philip F. H. Rose is a project leader for PC Labs.

Paula Seefeldt is an editorial assistant at *PC Magazine*.

Jennifer Zaino is an assistant editor of *PC Magazine*.



FACT FILE



**Business Graphics II,
Version 2.02**
Stella Systems
10430 S. De Anza Blvd.,
#185
Cupertino, CA 95014
(408) 257-6644
List Price: \$199

Requires: 512K RAM, DOS 2.01 or later.
In Short: This one has good documentation, is easy to use, and comes with a money-back guarantee that you'll produce a chart within 5 minutes. It is competitively priced but limited in capability: you can't size graphic elements, create a combo chart, or use illustrations in your graph. Not copy protected.

CIRCLE 694 ON READER SERVICE CARD

voked through menus at the bottom of the screen.

One of the missing graphics elements in the program is the ability to decorate a chart with pictures. But there is a pictograph chart that uses childlike symbols to tell its numeric story. *Business Graphics II* comes with a small set of these symbols, including a car, a bag of money, a telephone, and a house. You can create additional symbols—bringing the total to 26 in all—in a process similar to painting with fat bits. Because a pictograph can have only one data item, it isn't very useful.

OUTSTANDING INTERFACE The printing facilities in *Business Graphics II* are a little more advanced than its graphing facilities. You can print up to four graphs on one sheet of paper, in nine different positions, except when using a plotter—the program allows for only one chart on a plotted page. You can print in landscape or portrait orientations, adjust the image resolution, choose color or black and white, and set the paper size and number of copies.

Business Graphics II's one outstanding gift is the user interface. Because of it, the company's money-back guarantee on producing a graph within the first 5 minutes is hardly in jeopardy. But the graphs you can produce are very basic. If that's all you need, then this is a good package. On the other hand, if formal presentations are on your agenda, you might want to seek a package with more power, flexibility, and pizzazz.—Henry Fersko-Weiss

Chart-Master

Chart-Master was once the graphics software sales chartbuster from market tyro Ashton-Tate, best known for *dBASE*. Selling for \$375 alone and for \$495 bundled with *Sign-Master* and *Diagram-Master* into the *Mastergraphics Presentation Pack*, to this day it remains one of the three current top sellers in the graphics arena, along with *Harvard Graphics* and *Free-lance Plus*. But in terms of features, the other two market leaders and a number of comparably priced up-to-date programs reviewed in this issue are leaving *Chart-Master* in the dust.

With *Chart-Master*, producing good-



FACT FILE



**Chart-Master,
Version 6.21**
Ashton-Tate Corp.
Graphics Products
Center
25 Sylvan Rd. South
Westport, CT 06880
(203) 222-1974

List Price: \$375

Requires: 512K RAM, DOS 2.0 or later.
In Short: This easy-to-use but tedious menu-oriented program has been around too long without an update; it lacks 3-D, PostScript support, and the ability to import 1-2-3 files directly. Not copy protected.

CIRCLE 693 ON READER SERVICE CARD

looking charts is admittedly easy—no doubt one of the chief reasons for its popularity among business users. Especially if you've never used a graphics package before, the program will make you feel like a master of charts in a matter of hours.

Unfortunately, once you've mastered what *Chart-Master* has to offer—eight chart types, the Datagrabber file-importing feature, plotting options such as floating labels and symbols, and other enhancements such as colors and hatching patterns—you'll be left wondering, "Is that all there is?"

Creating graphics with menu-driven, screen-oriented *Chart-Master* is more like writing than graphing: you make menu choices, fill in screens, and answer prompts "blind." Like a number of other graphics packages we reviewed (*Free-lance Plus*, for example), *Chart-Master* takes the approach of showing you the chart only after you've filled in the blanks and asked it to Plot/Preview. This approach is easy and fast, but it skimps on direct graphics control, and it's fast becoming old hat.

Bolstering *Chart-Master* are the other packages in the *Mastergraphics Presentation Pack*: *Diagram-Master* and *Sign-Master*. These two programs can supply the word charts and organization charts missing from *Chart-Master's* list of chart types, which includes standard bar, line, pie, column, scatter, and area charts. But even so, you'll find you're missing mas-

ON WITH THE SHOW

General Parametrics' VideoShow sets the standard for automated presentations.

General Parametrics Corp. caused quite a stir when it introduced VideoShow and *Pictu'reIt* in 1984. This hardware/software combination opened a new realm of possibilities in graphics presentations. At a time when only a handful of presentation graphics packages were on the market, the introduction of a real-time slide-show system was a real stride forward.

PORTABLE PRESENTATIONS VideoShow let you turn a standard CGA monitor into a vehicle for presenting high-quality graphics in stunning 2,000-by-500 resolution and a palette of 1,000 colors. It let you display your charts in sequence as a self-running or user-controlled "slide show" on the screen. And best yet, it was portable. A sales rep on the road had merely to plug the VideoShow unit into a monitor at his destination, insert a disk he'd created with *Pictu'reIt*, and let the presentation roll.

VideoShow still offers these capabilities. In fact, in 1988 it offers a lot more. In today's market, its magic is shared by graphics software packages that have begun incorporating slide-show capabilities. Nevertheless, VideoShow remains the standard for portable presentations.

The \$4,595 VideoShow 160 of today's market is a 16-pound unit with its own processor, disk drive, and built-in 23-key keypad. For an extra \$100, General Parametrics will deliver it in a carrying case that is only a bit larger than a



VideoShow 160

General Parametrics Corp.
1250 9th St.
Berkeley, CA 94710
(415) 524-3950

List Price: VideoShow 160, \$4,595. The Desktop Presenter Pack, \$2,595; purchased separately: *Pictu'reIt*, Version 2.4, \$700; ColorMetric 20 Card and ColorMetric Connection, Version 1.1, \$1,695; *Print-Maker*, \$395.

Requires: 384K RAM (512K recommended), graphics card and monitor (CGA, EGA, or VGA), DOS 3.0 or later. Hard disk recommended.

In Short: Though many of today's presentational graphics software packages offer slide-show capabilities, the VideoShow family of products remains the standard in portable slide-show systems. Size, weight, and attractive carrying case make the VideoShow 160 handy for traveling shows.

CIRCLE 66 ON READER SERVICE CARD

Samsonite briefcase. You provide the CGA, EGA, or VGA monitor. The company recommends a CGA for best results, and the unit we tested produced noticeable flicker on an EGA monitor and some flicker on a CGA monitor, though not enough to be noticed by an audience 4 feet away.

You assemble a desktop presentation by creating and organizing your chart files on a PC, using either General Parametrics' *Pictu'reIt* or one of the other business graphics packages that now support VideoShow.

If you're using *Pictu'reIt*, you can copy your charts onto a floppy disk and just insert the disk in the drive on the VideoShow unit to start the show. You can also connect the VideoShow directly to your computer and run a presentation from your hard disk drive. If you're using a third-party graphics package, you must connect VideoShow to your PC.

NEW TO THE SCENE One of General Parametrics' newer offerings is the ColorMetric 20 Card, an add-on board that lets your PC emulate a VideoShow. You can use this card to preview your graphic images or display a slide show, though you can also use your CGA or EGA board for this purpose.

(General Parametrics' other new addition to the line, the VideoShow Professional, makes use of True Vision's Targa board to give you 100,000 on-screen colors. It lets you include digitized pho-

to of some of the things that more-up-to-date packages (including Ashton-Tate's new graphics product, *Draw Applause*) can offer: more options for data input and 3-D, mouse, and PostScript support.

PROMPT RESPONSE *Chart-Master* is menu driven, with nine choices available from the main menu: Create a Chart, Plot/Preview, Edit a Chart, Store/Re-

trieve/Delete Chart, Change Plotting Options, Plot Multiple Charts, Change/Display Configuration, Run Datagrabber, and Quit Menu. A series of submenus, in which you fill in your responses to the program's prompts, follows each main menu selection. When you choose Create a Chart, for example, *Chart-Master* first prompts you to enter the text for the chart's title and axes labels before you move on to

complete the remaining input screens (there are eight in all for this menu choice). The setup of the screens is stodgy, and moving through them to get to what you need becomes tedious as soon as you've put in just a few hours using *Chart-Master*.

CHOOSE YOUR OPTION When you type in your text entries, *Chart-Master* shows you six categories of text options at

tographs in your presentations—and see for a whopping \$8,995.)

SLICK SLIDE SHOWS Using ColorMetric board or the VideoSt you can move from one chart to the by simply pressing a key, or you can the whole sequence automatically can specify how long you want to r each chart, or you can stop a slid at any time and jump to another. With *PrintMaker*, General Para collection of printer drivers, you erate paper output of your files.

VideoShow provides fea available on the ColorMetric such as fades, wipes, sp weaves. You can pop an arr screen and move it around t. Press a button to rotate the p another and you change it white to black or make it fl

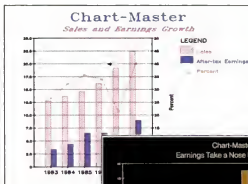
For \$2,595, you can t top Presenter Pack containing *PictureIt*, the ColorMetric 20 Card, *PrintMaker*, and *ColorMetric Connection* software. Better still is VideoShow 160, which lets you put together slick slide show presentations with sophisticated options.

These components are no longer the only game in town; today, presentations can be run from programs with slide-show capabilities using the hardware you presently have on your desk. But the VideoShow family of products still has a lot to offer the professional presenter.

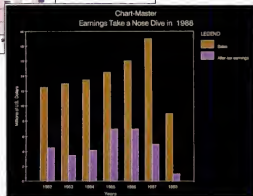
—Robert Kendall

the bottom of the screen: font, size, italics, justify, color (up to eight colors are available), and underline. You can choose any of nine fonts, including Standard, Bold, Roman, Bold Roman, Script, Swiss, Bold Swiss, and Gothic; plus the Symbol font, which lets you add any of the 94 available symbols pictured on the template that comes with the program.

Changing, sizing, and enhancing the



Three-dimensional effects are among the enhancements missing from Chart-Master, but you can easily get good-looking slides with overnight delivery by using the Ashton-Tate Graphics Service.



fonts are easy, and you can elect to use the program's defaults if you like, quickly moving on to the data entry process. At first, entering data may be a bit confusing, since *Chart-Master* has its own vocabulary. In our test bar charts, for example, Sales and After-Tax Earnings are the variables and the years are the observations. The manual clearly explains the terminology, though, and you get used to it quickly enough, especially after confusing the terms once or twice and viewing your results with the Plot/Preview option.

You can customize your charts by using the nine pages of options, which allow you to change the program's defaults for its four hatching patterns, eight line types, and the location of the chart on the page. Again, you're left on your own to visualize your chart; it's unseen until you command *Chart-Master* to Plot/Preview. Even after you plot your charts, you'll have to continue to visualize 3-D in your mind, since *Chart-Master* has not yet entered the three-dimensional world.

Adding symbols is easy; there are 94 in

all, including such items as a cow, train, flag, and lightning bolt, as well as arrows, geometric shapes, and math symbols. When you ask it to add symbols or floating labels, *Chart-Master* changes the screen into a black-and-white display of the chart—the only time and place you can manipulate chart elements directly, albeit primitively. You press Insert, move the cursor to the spot on the chart where you want the symbol or label to appear, and then press Enter. You can size, justify, and enhance the symbols and labels with color, italics, and underlining by using the font options.

GRAB BAG Entering data manually is a cinch, as *Chart-Master* helps out by automatically generating the successive months, years, or numbers for observations you've set up in those categories. The Datagraber feature makes importing data from files created in other programs equally trouble-free—if the files are in .DIF, SYLK, or print (ASCII) format. You must use *Lotus 1-2-3's* Lotus Translate Utility to

■ DESKTOP SOLUTIONS

translate .WK1 and .WKS files to .DIF files before you can import them into *Chart-Master*. We'd suspect that this was carrying Lotus/Ashton-Tate rivalry too far—if you didn't also have to convert dBASE .DBF files to print files before the Datagrabber can "grab" them.

Along with the lack of 3-D effects and mouse support, this necessity of translating the ever-so-peripatetic .WK1 and .WKS files within 1-2-3 before *Chart-Master* will accept data from them puts *Chart-Master* a few steps behind the current vanguard of graphics programs. Another telltale sign of the program's need for updating is the conspicuous lack of support for any laser printers other than the Hew-

tious as the Caterpillar and as rigid as the Red Queen. Unless Ashton-Tate releases a major update of *Chart-Master* soon, the company would be wise to focus attention on its more advanced graphics package, *Draw Applause*, and let *Chart-Master* fade away like the Cheshire cat.

—Carol Olsen Day

Decision Graphics

Samna Corp.'s *Decision Graphics* is definitely not just another pretty graph maker.

This \$450 program occupies an interesting niche among graphics packages. It is not the graphing package for occasional users who want to knock out a quick chart; learning its macro-driven interface requires discipline and dedication. Nor will the charts it produces win any beauty contests. At a time when the typeset quality and smooth curves of PostScript output are setting the standard for presentation graphics, the aesthetics of *Decision Graphics*' charts are clearly bounded by the limitations of pen plotters.

THE ANALYST'S TOOL. Still, *Decision Graphics*' considerable analytical muscle is capable of much more than simply turning a row of numbers into a bar chart. And the program's macro language can completely automate the process of importing data and producing a set of graphs. For users who need unusual graphs—a logarith-

mic chart, for example—or who need to produce the same set of charts repeatedly with varying data, *Decision Graphics*' less-than-stunning graphics quality may be an acceptable trade-off.

The easiest thing about *Decision Graphics* is installing it. The program and its device drivers and type font library come on five disks, and the on-screen installation instructions make the manual unnecessary.

However, a manual is absolutely vital once the program is started up because the user interface is anything but straightforward. The left-hand third of the screen is devoted to a menu, the middle third to a list of available data files, and the right-hand third to a list of macros. Almost lost in all this is a single line across the bottom of the screen—which is the actual command line. Despite this very busy menu structure, *Decision Graphics* does not prompt the user through its processes. Error messages are nonexistent or nonhelpful, and there is no on-line help.

Fortunately, the brief tutorial (a chapter of the manual supported by a demo file on disk) dispels a lot of anxiety very quickly—it's a very useful tour of the program's features and a great confidence-builder.

The manual itself is voluminous, but is not organized well enough to serve as the encyclopedic reference a beginning user needs. Instructions for basic functions—changing the height and color of

Unless it updates Chart-Master, Ashton-Tate should let it fade like the Cheshire cat.

lett-Packard LaserJet Plus and the Xerox 4045 (you can also use the HP LaserJet Series II at 150 dots per inch).

One valuable service that Ashton-Tate offers is its *Master Graphics Overnight*, a \$50 software utility and site license for users of the *MasterGraphics Presentation Pack* programs, including *Chart-Master*. It's a good deal: you can transmit your files via modem or send them on-disk by courier or mail to the Ashton-Tate Graphics Service. What's really impressive is that the next business day after your order arrives, you'll get back professional 35mm slides, color overhead transparencies, or color or black-and-white paper prints. You couldn't expect such prompt service from an overloaded in-house graphics department.

GRAPHICS IN WONDERLAND

Chart-Master's manual uses brief quotations from Lewis Carroll's *Alice* books to introduce each chapter—an apt literary reference, since graphics creation can be a strange, pleasingly or confusingly wondrous new world. Creating graphics with *Chart-Master*, though, can be as repeti-

Samna Decision Graphics Earnings Soar in 1988



Figures Reported as Millions of U.S. Dollars

Decision Graphics is designed more for statistical analysis than presentation graphics and is stronger on plotter support than it is on film recorders. Plotter output is shown here.

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VGA	640x480 320x240	288/288 C
EGA	640x350	16/88
CGA	640x350	16/88
MDA	720x400	8/88

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■ DESKTOP SOLUTIONS

text, printing a full-page graph with a laser printer—are difficult to root out of the many short chapters.

In practice, combining a graph with text—the one function users probably rely on most in a graphics package—is excruciatingly difficult. Even a simple title is difficult to insert. The best solution is to use the program's ability to put multiple windows on a screen: plot the graph in a smaller window, then write the text in a full-sized window around it.

BETTER THAN A CALCULATOR But if its ability to handle text isn't a strong point, *Decision Graphics* can certainly deal with data. The program can read data directly from *Lotus 1-2-3* and *Symphony* worksheets, as well as *Samna IV* and *Multiplan* files. In contrast to other parts of the program interface, the data-acquisition process is exemplary: once you bring the text and numbers from the selected file to the screen, the program prompts you through the process of identifying and naming data sets. You can edit the data easily as well.

Decision Graphics offers some very sophisticated analysis tools, including logarithmic functions and linear regression to manipulate data. No fewer than 147 macro commands are available to control the processing and presentation of graphs.

The macro language can automate the whole process of making a chart—from importing the data to managing the output of the finished graph by sending it to a printer or making it part of a presentation display. Complex images and processes can be built by chaining together simple macros. This makes it very easy to send a batch of graphs to a printer or to create a continuous "slide show" of screen images. *Decision Graphics* can even be run from the DOS command prompt by using a macro filename as an argument, which makes it possible to invoke the program from a batch file.

The current version of *Decision Graphics* offers limited output options compared with other packages, and the list of devices it will support is short on newer technologies, such as film recorders and ink jet printers. While output samples from a Hewlett-Packard PaintJet and a film recorder were part of the test procedure for all the graphics programs reviewed in this issue, the current version of *Decision Graphics*—Version 3.1—does not support the PaintJet. It does support the Hewlett-Packard 7510A film recorder, but we could not locate a source for output slides using this package to drive that camera. According to Samna, a new version of the program will add drivers for several devices, including the PaintJet.

PLOTTER POWER *Decision Graphics* won't export its data files for use by other programs, but it will create graphics files in formats usable by *Lotus 1-2-3* and the VideoShow presentation controller, Aldus Corp.'s *PageMaker*, and *PC Paintbrush*.

Decision Graphics' output is clearly geared for pen plotters. Its 12 type fonts are graphically awkward as only plotter type fonts can be. Other graphic blandishments are limited: A collection of 16 symbols can be substituted for more-prosaic bars in graphs. There are nine thematic collections of small ornaments organized as type fonts and a couple of dozen full-page borders. All have a jagged, low-resolution feel. The program does support 16 colors on-screen when used on a PC equipped with an EGA, and the default color palette is vivid, to say the least.

The program's name may sum it up. All things considered, *Decision Graphics*

is less a presentation graphics package than a tool for presenting data analyses in visual form—a tool for shirtsleeve decision-making rather than boardroom persuasion. —David DeJean

Draw Applause

Draw Applause is Ashton-Tate Corp.'s hot new entry in the presentation graphics market. It was one of the two most-talked-about programs at the National Computer Graphics Association's conference in March, and it lost to the other, Zenographics' *Pixie*, by a single vote in the NCGA software "shoot-out." (See the *Pixie* review in this issue.)

Though its traditional approach to graphics composition (preparing charts, composing text, and adding enhancements in separate screens) is far less interesting than *Pixie*'s direct manipulation of graphics elements, *Draw Applause* is a much more powerful package—and also comes at a more powerful price. *Draw Applause* lists at \$495, compared with *Pixie*'s \$195.

Its basic "graphics engine" is the slide-generation program *Excaliber*, which Ashton-Tate purchased along with *Decision Resources* in 1986. Now in its first version as *Draw Applause*, the program is showing incredible potential. It is a far superior product to the company's aging but still popular *Chart-Master* (also reviewed



FACT FILE



Decision Graphics, Version 3.1
Samna Corp.
270 Northeast Expwy.,
Suite C-700
Atlanta, GA 30345
(800) 241-2065
(404) 851-0007

List Price: \$450

Requires: 256K RAM, DOS 1.0 or later.
In Short: Better suited to the statistical analyst than to the artist, *Decision Graphics* is a powerful analytical tool with excellent support of plotters. Limited text-handling capabilities and slim support of film recorders, however, make it better suited for desktop use than for presentational graphics. Not copy protected.

CIRCLE 68 ON READER SERVICE CARD



FACT FILE



Draw Applause, Version 1.0
Ashton-Tate Corp.
20101 Hamilton Ave.
Torrance, CA 90502-1319
(213) 329-8000
List Price: \$495

Requires: 640K RAM, DOS 2.10 or later.
In Short: Though device and font support isn't fully developed, this is an impressive first release. Lovely clip art that can be edited by the user, the ability to rotate and distribute text, and an almost seamless link to the MGI Corp service bureau make *Draw Applause* a serious contender among graphics software. Not copy protected.

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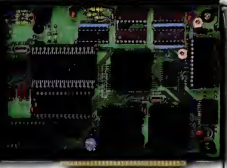
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■ DESKTOP SOLUTIONS

here), and the program clearly represents Ashton-Tate's future in PC graphics.

The *Draw Applause* user interface employs a combination of pull-down menus and program functions located across the top of the screen, an icon panel on the right, and an option panel across the bottom. You can use the keyboard if you like, but who would? Anyone planning to do serious computer graphics on a PC shouldn't consider doing so without a mouse, and this certainly is true here.

In this first version, however, the number of drivers for input devices is limited, and once you select the mouse as your input device, the keyboard is no longer usable for any function other than entering text or filenames. Say, for example, that you're at the bottom of your picture screen and want to save your picture using the keyboard. You'll have to move the mouse to the top of the screen, select Library, and then go through a series of key commands to do it. You cannot simply hit the first letter of your menu selections to advance through the program.

WINDOW, WINDOW, WINDOW

Draw Applause uses three different types of windows—Word, Chart, and Picture. Context-sensitive help is available within each. Through the Word window you generate text-oriented charts. The Chart window lets you enter data and generate a variety of graphs. And in the Picture window you can enhance graphics you developed in the other two. The Picture window is also the only place that offers access to the library functions, which store and retrieve your graphs, charts, and pictures.

When creating bullet charts in the Word window, you can either create your own format or use one of the eight default templates supplied with the program. These templates, which offer a selection of pie, bar, line, table, and area charts, may be enough for most users and, if you have no real eye for good design, could protect you from your own bad taste. They're designed to give you consistent, attractive charts with color combinations that produce professional-quality slides.

Within the Word window you can control the size, style, and color of text, the type of bullets used, and background colors either from the standard palette or from

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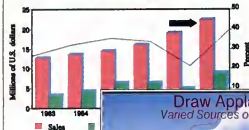
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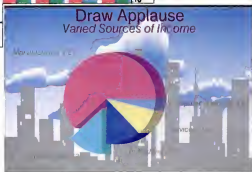
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Draw Applause Sales and Earnings Growth



Draw Applause's slide files can be sent directly to the Ashton-Tate Graphics Service via a communications module in the program. It does not yet support the HP PaintJet, but plotter output was crisp and clip art is stellar.



spring, summer, autumn, or winter palettes. When you've finished the word/bullet chart in this window, you must transfer it to the Picture window for saving or further enhancement.

In the Chart window you enter data and generate various types of graphs. Data entry is either from the keyboard or from imported data, although so far *Draw Applause* can directly import chart data only from .WK1 or .DIF files. To speed manual data entry, you can specify automatic month generation or the starting point, ending point, and increments for number series.

Another choice, mixed charts, lets you specify variables to create different chart types. You can generate, for example, combination bar/line charts—a real time-saving feature. Within the bar chart you have the options of horizontal or vertical charts, stacked charts, automatic legend generation, and 3-D. *Draw Applause* automatically scales and increments the x and y axes, but you can specify your own maximum, minimum, and increment values.

Additionally, you can set the y axis to right or left, set vertical and horizontal

grids on or off, and even turn off the axes to make the values appear to float. Pie charts offer 3-D and exploding slices. Percentages are calculated, and variable names are automatically shown beside the corresponding pie slices. While each slice of the pie can be selected for explosion, the amount of explosion is not user-controlled within the Chart window. Again, all graphs generated in the Chart window must be transferred to the Picture window for saving or further enhancement.

BUT CAN YOU PEELE THE BANANA?

It's in *Draw Applause*'s Picture window that you come face to face with the program's real power. You bring word charts and graphs into the Picture screen. *Draw Applause* treats the chart as a single object until you "unlink" it. Then you can move, copy, size, or stretch the individual elements of your chart. Unlink is a particularly powerful command that can also be used on the program's excellent, sizable clip-art gallery.

The artistic quality of the gallery is outstanding. Its cityscapes, sunsets, forests, and ocean scenes would do any landscape

artist proud. But if you can't find something you like among the images, you can edit the art to create your own. Once you have imported an image to your chart, you can use Unlink to edit it. Once the image is unlinked, you can manipulate the elements in the image, erase or edit them, then save the image back to the library as a new file. In this way, you become author of your own clip-art library, expanding it to contain as many individual elements as you can identify in the original images.

Load the fruit bowl image, for example. Unlink it and delete the banana, the orange, or both, or any other element until you're left with just the apple. You can save the apple or copy it to your graph, where you can stretch or size it. And if the apple is not to your liking, you can do the same with the banana.

In addition to drawing capabilities like lines, boxes, circles, arcs, and polygons, *Draw Applause* lets you rotate text to any angle and offers a "distribute" feature in its Picture window. This feature lets you extend your line of text toward a vanishing point, giving it a halo background or the illusion of perspective. You can also enter text, change text alignment and colors, add drop shadows, or change the size or color of virtually any unlinked object in the Picture window.

After you complete and save your final pictures, *Draw Applause*'s batch feature can create a timed slide show for your presentation. Select the pictures and order for your show and set the timing for slide presentation in 10-second increments.

TUTORIAL IN LIVING COLOR Supplied on six floppy disks, *Draw Applause* comes with three manuals and a quick-reference card. The spiral-bound Learning and Using manuals each have tab-separated chapters and an excellent index. You won't find a disk-based tutorial, but the Learning manual furnishes well-organized, step-by-step lessons that quickly familiarize you with *Draw Applause*'s powerful features. This tutorial's illustrations show how your screen should look as you proceed through each lesson—and what's more, they're in color.

Also in the Learning manual is a helpful section to guide the novice through the basics of developing an effective presenta-

tion—from designing a storyboard to selecting the appropriate types of graphs and colors.

Installation to your hard disk (1.3MB required) is done through a menu-driven setup program. Keep in mind that since Version 1.0 takes a healthy 580K of RAM to run, you'll be limited in the number of TSRs you can load prior to executing *Draw Applause*.

BUSMOUSE BLUES You're prompted during the installation for various input/output devices, and you'll then notice some limitations of Version 1.0. Noticeable in their absence from the supported mouse list is the Microsoft Bus Mouse as well as Logitech mice. Logitech mice are certified for use with either a (three-button) Mouse Systems driver or a (two-button) Microsoft serial driver—both of which come with the program—but you'll never find that fact in the manuals. Ashton-Tate advises that future releases will specifically support these devices and that a Microsoft Bus Mouse driver will be available from its customer service department, but right now the support isn't there.

Also limited is the array of output devices compatible with the program. Although *Draw Applause* supports EGA, VGA, PGC, and Vermont Microsystems standards, the range of support for printers and plotters is disappointing. For instance, there is no support for PostScript printers, a serious oversight for a presentation-quality graphics package. Again, Ashton-Tate promises a more generous offering of drivers in the next release.

SLIDES LIKE MAGIC If *Draw Applause* is light on printer support, it makes slide production so easy that you'll want to take your creations to the screen. The program has a seamless interface to a companion service bureau, the Ashton-Tate Graphics Service. The service converts your *Draw Applause* pictures into slides, transparencies, or black-and-white prints. The connection to the service can be made automatically from within *Draw Applause*, using a program that initializes and controls your modem. After receiving an account number from the Ashton-Tate service bureau (actually MAGIcorp, one of the nation's largest service bureaus, which

performs the service for Ashton-Tate), you use the simple, menu-driven program to send your graphics files.

Although the manual indicates that the quality of your slides might suffer if you use another service, any service bureau with a 4,000-line Matrix camera should have no problem producing quality slides from *Draw Applause* files. The automatic link to MAGIcorp just makes it easier, and because the communications program uses a data compression scheme patented by MAGIcorp, you needn't worry about tying up your computer and modem transmitting large image files.

Even as a first release, *Draw Applause* delivers an impressive performance. It is superior to much that's on the market and certainly steals the show from *Chart-Master*, its sister in the Ashton-Tate graphics family. *Draw Applause* deserves a hearty cheer. If Ashton-Tate delivers on its promises for future versions, spiffing up the user interface and improving device support, the sequels could merit a standing ovation. —Craig Ellison

Freelance Plus

If you had to pick one tool and use it for all of your graphics needs, *Freelance Plus* might be the ticket. With a list price of \$495, it's an all-around player—strong in graphing, in composing graphics from built-in objects, and in free-form drawing. Easy import from *Lotus 1-2-3* (both worksheet and graphics), *Symphony*, *Graphwriter*, and *dBASE* files, coupled with its export to .CGM files, makes *Freelance Plus* a good candidate for producing business presentation graphics. Best of all, the list of supported output devices reads like a Who's Who of Output. That's precisely what's required for today's multimedia graphics environment.

Given those capabilities, it's no surprise that *Freelance Plus* has enhanced the image of Lotus Development Corp. as something more than the company that brought us 1-2-3. In terms of sales, *Freelance Plus* reigns with Software Publishing Corp.'s *Harvard Graphics* and Ashton-Tate's *Chart-Master* series as one of the leading graphics products today.

Freelance Plus comes packaged on nine floppy disks and is easily installed on

a hard disk. The program contains three components: the draw program itself, a Setup module to select and configure drivers and fonts, and a Batch module for printing multiple graphics. During the setup procedure, you can install and configure three different output devices for use during your *Freelance* sessions. Two supplemental driver disks include drivers for many new printer devices such as the HP PaintJet and DeskJet; they sell for \$20. Lotus also offers elaborate map library packages at an additional cost.

Freelance Plus's menu bar (similar to 1-2-3's) offers you a straightforward interface—point and shoot or type the first letter of the command. For example, you can select Add to access the program's assortment of graphics primitives, then add text, lines, arrows, rectangles, circles, slices, arcs, markers, or polygons to compose an image. Each primitive can be customized with respect to a number of characteristics, including line widths, line styles, colors, marker types, and fill patterns. You can also use a mouse or tablet to trace images or enter free-form graphics. You may edit these images, as you would any other *Freelance* images, by sizing, filling, rotating, and repositioning them.

Like most business graphics packages, *Freelance* doesn't allow you to "paint" the image with paint-package-style brushes and fills. For your drawing convenience, however, there is a built-in symbol library with more than 500 predrawn symbols. You can incorporate these directly into the graphic or modify existing symbols to create new ones. It is also possible to edit and fine-tune images in a workspace and then incorporate them into the main drawing area.

EASY EDITING Graphing, though not the program's major focus, is certainly well implemented. Using the Chart-Options you can create standard bar, line, pie, text, and scatter x-y graphs (although *Freelance* does not support any 3-D graphing features). A fill-in-the-blank form lets you enter data and assign color, font, titles, and other chart information. The chart data can be stored separately from your drawing, which is useful if you want the same data to be output to a number of different charts. It's easy to manipulate a graph and



Achieving the Proper Image

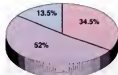
Corporate America wants more from graphics than what it sees in Lotus 1-2-3. Good-looking paper handouts and snappy overhead transparencies are the hallmarks of a quality presentation. More and more, too, the person with a point to make is bringing slides into meetings.

Graphics software is improving the quality of business presentations. To understand more about what's hot in the market and why, and how people regard graphics software, *PC Magazine* polled its readers. In surveys conducted on PC MagNet and the Interactive Reader Service from May 6 through May 18, 1,267 people gave us their opinions on standard business graphics programs such as *Harvard Graphics*, *Freelance Plus*, and *Microsoft Chart*.

More than 63 percent of those who responded to the survey said they use business presentation graphics software. Here is what they reported.

—Robert Nisonoff

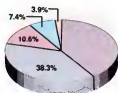
1. When your company creates business graphics presentations on PCs, how often are those presentations primarily an illustration of data developed on electronic spreadsheets?



	Number of Respondents	Percentage
Almost always	275	34.5%
Some of the time	415	52.0%
Very rarely or never	108	13.5%

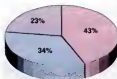
Fifty-two percent answered "some of the time." Thirteen and a half percent claimed they almost never use data developed on electronic spreadsheets, and more than 31 percent said they almost always do.

2. In what form does your company most often present business graphics created with PC software?



No real surprises here. Paper handouts and overhead transparencies ran neck and neck. These two categories seem to be the established mode of presenting business graphics; they accounted for more than 78 percent of our tallied responses. Only 85 people said they used slides.

3. How does your company most often produce slides from PC business graphics files?



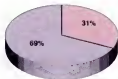
Among those who said they used slides, 43 percent said they produced slides with low-resolution desktop film recorders, such as the Polaroid Palette, while 23 percent said they used in-house high-resolution film recorders, such as the Matrix. Thirty-four percent said they used an outside supplier.

4. Which graphics software package is most often used in your company?

Harvard Graphics	187	23.5%
Chart-Master or Mastergraphics	57	7.2%
Lotus 1-2-3	154	19.3%
Spreadsheet or database other than 1-2-3	63	7.9%
Freelance Plus	112	14.1%
Microsoft Chart	41	5.1%
Windows Graph	9	1.1%
Boeing Graph	10	1.2%
Energraphics	7	0.9%
GEM Word Chart or Graph	16	2.0%
Lotus Graphwriter II	15	1.9%
None	3	0.4%
Other	123	15.4%

Harvard Graphics was the resounding favorite, with a little more than 23 percent of the vote. Surprisingly, more than 19 percent of our respondents indicated that 1-2-3's graphics, however disappointing, remain the mainstay in their organizations. In third place was Lotus Development's *Freelance Plus*, with about 14 percent of the response. Nevertheless, quite a few of our respondents answered "other" to this question, and among them, the majority indicated they use Microsoft's spreadsheet, *Excel*. Another favorite was *Mirage*, Zenographics' high-end software for the corporate art department.

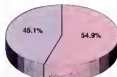
5. Are Lotus 1-2-3-based graphics presentations adequate to your current needs, or do you or your company have plans to upgrade to a sophisticated graphics package in the next 12 months?



Adequate; no purchase plans	25	31.0%
Inadequate; plan to upgrade	55	69.0%

Lotus 1-2-3 users indicated they are not happy with the graphics output they're getting from the spreadsheet. Sixty-nine percent said that 1-2-3 does not fulfill their graphics desires, while only 31 percent said they were satisfied.

6. If you are not presently using graphics software, do you or your company plan to purchase a package within the next 12 months?



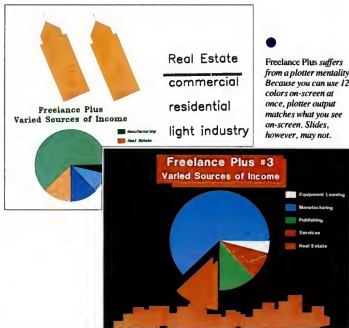
Yes	244	54.9%
No	201	45.1%

The percentages indicate that most persons in this group are likely to buy. Fifty-five percent said they were likely to make a purchase.

7. Which business presentation graphics software program is your company considering purchasing in the next 12 months?

Lotus 1-2-3	30	12.2%
Harvard Graphics	83	33.9%
Chart-Master	8	3.3%
Freelance Plus	13	5.3%
Microsoft Chart	22	9.1%
Windows Graph	11	4.6%
Boeing Graph	12	5.0%
GEM Word Chart	6	2.4%
Lotus Graphwriter	12	5.0%
Pixie	6	2.4%
Draw Applause	7	2.9%
Other	34	13.9%

Harvard Graphics was the unquestioned favorite among those planning to make a first-time purchase. Although many indicated that they planned to stick with 1-2-3's graphics, Harvard bested the spreadsheet by more than 20 percent. *Microsoft Chart*, again, made a surprising showing for an aging product; a little more than 9 percent of our respondents were interested in it.



Freelance Plus suffers from a plotter mentality. Because you can use 12 colors on-screen at once, plotter output matches what you see on-screen. Slides, however, may not.

explode slices, combine graph types, or annotate text. The only difficulty is that you cannot delete a single data element in the chart without rekeying the data for the entire chart.

Freelance's menus are occasionally counterintuitive, forcing you to go backward in order to proceed. For example, you select Chart-Options to create a graph. To save the graph you've created, you must exit the options menu, go back to the top-level menu bar, and select Chart-Save. A Chart-Options-Save routine would have been more sensible.

The key to editing a graphic is to select the edit objects first. This allows for powerful manipulations because you can group individual objects while editing. There are numerous options for selecting objects: you can select one at a time, point to one and have the program automatically select like objects, select touching objects, select objects inside a marked area, and so forth. As you select objects, small filled squares appear on the objects' boundaries as markers. In a complex drawing, the variety of

select options and the difficulty of being sure which objects you've selected can be bewildering. With practice you become adept.

Editing objects is a *Freelance* forte. You can shrink, flip, rotate, size, and move objects. A "priority" feature lets you overlay objects using background and foreground. There is a robust set of grid tools, cursor types, viewing tools, and precision adjustments to ensure accuracy. In short, *Freelance*'s edit flexibility is hard to beat.

Freelance anachronistically uses the word "plot" on the menu to initiate output functions. Ironically, this choice of phrase embodies the most serious weakness of the program. *Freelance* suffers from a "plotter" mentality. You can use 12 colors on-screen at once. When using a high-resolution output device such as the Matrix Film Recorder, you may choose 12 from a palette of 72 colors. But you will not see those 12 colors accurately on-screen—in fact, pink may appear as blue. You'll need to adjust mentally. Furthermore, unless you

use *Freelance*'s EGA color utility to change the background screen color permanently, the background is always gray. It's difficult to visualize the de rigueur dark background of a 35mm slide when you're working in reverse.

NOT REAL WYSIWYG *Freelance* offers a variety of fonts, some built into the software and others supported through the selected hardware device. Fonts are not displayed in true WYSIWYG fashion. No matter what font you select, what you see on-screen is a stick-figure approximation of the font's height and width. You must refer to the document for printed samples of the fonts.

Granted, the non-WYSIWYG approach is fast and simple. It is part of the reason *Freelance* can support such a variety of font types and sizes. But once again, you need to compensate mentally, and problems arise. For example, I enclosed a graph title in a rectangular, drop-shadowed box. On-screen everything appeared fine, but when the fonts were output to a film recorder, they grew—and the text strayed outside of the box borders.

Freelance gallantly tries to anticipate problems by supplying excellent defaults for each of the devices it supports. When you create a drawing, you create it for a specific device. Since the drawing bound-

PC MAGAZINE FACT FILE



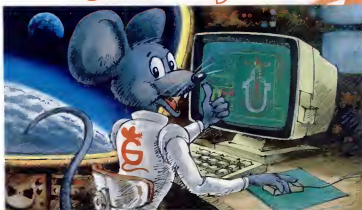
Freelance Plus, Version 2.0
Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
(617) 577-8500
List Price: \$495

Requires: 384K RAM, DOS 2.0 or later.
In Short: *Freelance Plus* has it all—charting, freehand drawing, and object/symbol drawing. It outputs to a wide variety of devices and offers an excellent menu of graphics editing tools. Occasionally the menu structure sends you backward to go forward, and the on-screen fonts and colors make it difficult to design for 35mm slides. Not copy protected.

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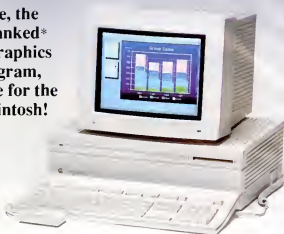
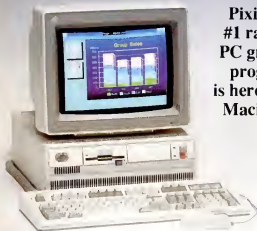
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■ DESKTOP SOLUTIONS

aries, color and hatching selections, and fonts defaults are device-dependent, the problems are less dramatic if you stick with the defaults.

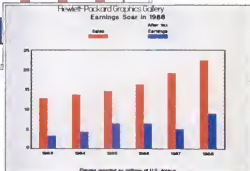
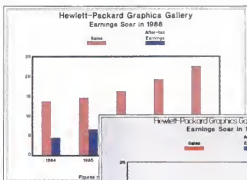
Freelance Plus is a flexible drawing tool for combining graphics, text, and chart materials. Its editing prowess is commendable. However, to keep pace with the demand for quality graphics, future releases will need to address issues such as 3-D drawing, drop shadows, graded color backgrounds, and true on-screen color and fonts. —Robin Raskin

The Gallery Collection

There is a theory about graphics programs which holds that if *Lotus 1-2-3* did what it should do graphically, we wouldn't need anything else.

The graphing capabilities of *1-2-3* are not only difficult to use, but out of date at best and downright ugly at worst. So there is plenty of room for graphics packages that do everything from simply prettifying up some of *1-2-3*'s worst uglies to supplying more kinds of presentation tools than Lotus will ever think of.

BEYOND 1-2-3 The Hewlett-Packard *Gallery Collection* falls somewhere toward the far end of this range of products: it is a powerful presentation tool with a



Figures reported as millions of U.S. dollars.

Hewlett-Packard's *The Gallery Collection* produces bold plotter output. Not surprisingly, it supports the HP 7510 film recorder and the HP PaintJet.

powerful list price of \$695. Together, *Charting Gallery* and *Drawing Gallery*, its two separate applications, go way beyond the limited graphics of *1-2-3*. The package offers a number of graph types, good text annotation capabilities, and a complete drawing program with extensive clip-art libraries. And its capabilities for exporting graph and data files and supporting a wide variety of output devices add to its power and usefulness.

With this package, a beginner can produce a basic graph just by booting up the application for the graph type of his choice and following the menus. To use the more-advanced functions, such as editing data and enhancing a chart with the drawing program, requires some expeditions into the manuals. But then, you didn't really expect that any program this powerful was going to be easy, did you?

The work begins right out of the box with the installation process. Installing *The Gallery Collection* on a hard disk—including bar, line, and pie chart applications, the *Drawing Gallery*, and two clip-art libraries—means handling 13 floppies.

The Gallery Collection will run on Hewlett-Packard's Vectra and Touchscreen PCs, or on any IBM PC or compati-

ble with 384K RAM and DOS 2.1 or later. HP reports that once *The Gallery Collection* has been patched to fix a problem with skipping the first screen, it can also run in the compatibility box of Hewlett-Packard's version of OS/2. The distribution disks include .PIF files for operation under *Microsoft Windows*. The *Drawing Gallery* requires a mouse or a graphics tablet. The minimum storage configuration is two floppy disk drives: one high-density (1.2MB) and one 360K.

Dealing with the program's user interface is real work, too. *The Gallery Collection* is command-key driven: a row of labeled blocks across the bottom of the screen correspond to function-key choices. A prompt line at the top of the screen is all the on-line help the program offers. Across the middle of the screen, the graph in progress is displayed to scale (which leaves the left third of the screen empty). The graph is replotted every time the user returns to this "main menu" screen from performing any function, whether it affected the graph or not. Waiting for this replot can become extremely tedious.

The menu structure is complex, and the use of function keys is awkward—particu-

PC
FACT FILE

FACT FILE



The Gallery Collection,
Version 2.0
Hewlett-Packard Co.
3000 Hanover St.
Palo Alto, CA 94304
(415) 857-1501
List Price: \$695
Requires: 384K RAM,

DOS 2.1 or later.

In Short: *The Gallery Collection* contains separate charting and drawing packages with extensive clip-art portfolios. A good selection of chart types and enhancement features along with a complete drawing program make the package very powerful, but a clumsy user interface, a lack of on-line help, and the separation between chart and draw functions make it frustrating to learn and use. Not copy protected.

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■ DESKTOP SOLUTIONS

larly when stepping through a list of options. The filing functions in Charting Gallery become especially aggravating. The program uses only the first eight function keys until it gets to filing, when F10 is assigned a function; and Drawing Gallery uses a different interface for its filing functions.

A WELCOME DRAW Drawing Gallery is a welcome addition to the package. Its connections to Charting Gallery are only the very loosest: a graph must be saved in the drawing program's file format, and once saved, it can't be reopened in Charting Gallery. But once a graph has been brought into the object-oriented Drawing Gallery program, its possibilities become almost limitless. It can be sized, combined with other graphs, and annotated with text or graphics. *The Gallery Collection* includes two clip-art libraries—a basic collection of artwork, borders, and fancy initials—and the Business Management Portfolio, an extensive collection of graphics, forms, and symbols, as well as an especially good selection of U.S. and world maps.

It is possible to use Drawing Gallery for simple tasks—such as placing a clip-art icon on a graph—without a mouse, but using cursor keys to control a drawing program is almost as productive as sitting and watching paint dry.

Once finished, a graph can be output to a wide range of devices and file formats. This is not surprising, since Hewlett-Packard makes not only *The Gallery Collection* software but one of the broadest lines of printer and plotter hardware from any manufacturer. The program supports HP's LaserJet laser printer at a resolution of 150 by 150 dots per inch, which means that the printer can produce a full-page chart without needing to be enhanced with extra memory. *The Gallery Collection* also makes good use of HP's PaintJet, the color ink jet printer that may be the best thing to have happened to presentation graphics since the invention of the pie chart.

The quality of *The Gallery Collection's* output is good but not great. Its range of type fonts and sizes is severely limited, though it can be enhanced with Drawing Gallery fonts. Its selection of line and fill styles is adequate, though it doesn't supply

the raster patterns that make best use of a laser printer. Its graphical style is utilitarian—no three-dimensional effects, no graduated fills. It is capable of making tasteful charts, but it won't save the user with no design sense from his worst ideas.

Patience and artistic ability will be rewarded, however. With enough drawing capabilities to enhance the appearance of your files, Hewlett-Packard's *Gallery Collection* is a versatile and powerful—if not altogether easy—graphics program.

—David DeJean

GEM Graph Presentation Pack

Quite an assortment of Digital Research applications has found a home under the GEM roof, including a desktop publishing package, a word processor, and a pixel-based paint program. The company has taken three of its integrated GEM applica-

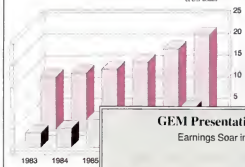
tions—*GEM Graph*, *GEM Draw Plus*, and *GEM WordChart*—and bundled them together to create a high-end business graphics product dubbed the *GEM Graph Presentation Pack*. This \$495 package provides all that most users would need to render their numbers in the most visually effective graphic form, and it has the added advantage of compatibility with the other GEM products.

Each GEM application comes with *GEM/3 Desktop*, which provides a *Microsoft Windows*-like graphics-oriented operating environment and a common interface for the application's components. This type of environment is best suited to a mouse, although one is not strictly required. Finding your way around in GEM couldn't be easier, since the menus are for the most part self-explanatory. Uncovering some of the *Presentation Pack's* less-obvious features can be a challenge, since the documentation suffers from a meager index. But once you've learned the pro-

GEM Presentation Team

Earnings Soar in 1988

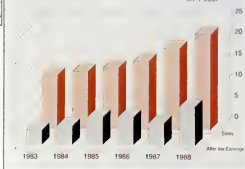
Figures reported in millions of U.S. dollars



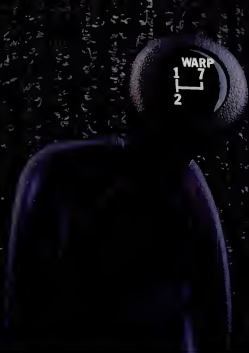
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■ DESKTOP SOLUTIONS

gram, even the most complex operations become second nature.

GEM Graph lets you import data in a number of formats and then displays it in a screen that resembles a spreadsheet. All labels and headings are imported into data cells, so you have to move them to the correct locations yourself. Fortunately, this is an easy task, since you can define cells, rows, and columns and delete, move, or edit them as you please. A handy Flip Data option lets you transpose all your data cells and labels so that what was on the x axis is moved to the y axis and vice versa.

A pull-down menu presents you with icons representing different types of graphs, and you just point and shoot to have your data graphed on-screen in the form you want. The choices include pie, line, and area charts, as well as every conceivable type of bar chart. A symbol graph option turns out a chart in which bars are replaced by repeated pictographs representing such things as buildings, people, or trucks. For regional statistics, you can turn out a map chart of either the United States or Europe. Replotting the data as a different type of graph is as easy as selecting a different icon.

The default layouts are exceptionally attractive and include automatically generated legends. You have the flexibility to

make just about any adjustments you want, and the display is fast enough to let you see the results of your changes almost immediately.

Most graph types default to perspective 3-D, but a 2-D option is available. You have a good deal of control over the background grid, the axis scales and ranges, line thickness, data point symbols, and whether labels appear in a legend or along the graph axes. The program will even calculate and display percentages or cumulative sums for y axis values.

THE MANIPULATIVE APPROACH

Whenever possible, the program lets you manipulate your images and select options as if they were physical objects, which is the most intuitive approach to graphics production. To change the color or fill pattern of a graph element, you define it by pointing to it with the cursor, and then you select the desired color or pattern from a pull-down palette. To change the font or size of text, you point to the text label, then select the font and size from a pull-down menu. You can add text comments anywhere simply by typing them in at the cursor position.

The **Presentation Pack** comes with seven sizes of Times Roman and Helvetica built in and includes a third font that you can install yourself. Additional *Fontware* fonts are available from Bitstream, but the price is steep—\$195 per font—and you can install no more than four at a time.

Many users will find the graphics-editing capabilities of **GEM Graph** alone quite adequate. But if you want to infuse some extra pizzazz into your creations, you can call a graph up in **GEM Draw Plus** for further doctoring. This general-purpose object-oriented graphics program lets you select and modify any element or group of elements in the graph. You can adjust height or width, delete, copy, or use the cursor to drag something to a new position. You alter colors and fill patterns just as in **GEM Graph**, but **GEM Draw Plus** offers a larger, 16-color palette and a larger selection of fill patterns (37). There's also a facility for creating simple geometric shapes, as well as a freehand-drawing mode.

GEM Draw Plus allows you to call up two different files in separate windows and

move or copy elements from one to the other by dragging them with the cursor. By this means, you can copy images from the program's good-sized library of clip art into your own graphs. You can also scale down several separate graphs and copy them all onto a single page.

The **Presentation Pack** provides no way of merging two separate graphs into one or of depicting two separate y axes in a

Rest assured that the high-quality graphics you create on-screen with GEM Graph will be matched in your hard-copy output.

single graph. You can, however, create a graph that plots one data set with a line and the others with bars.

FOR THE SPECIALIST If your needs run to more-specialized types of charts, **GEM Draw Plus** includes a library of templates and separate elements that you can copy and modify to create flow, organizational, and Gantt charts. For developing text charts, there's the **GEM WordChart** module. **WordChart** lets you add various types of bullets to text, enclose it in boxes, add lines above or below it, and create automatic outline numbering or lettering. The **WordChart** Template Gallery presents you with a screenful of icons representing the various templates you have at your disposal, including those you've created yourself.

In most cases, you can rest assured that the high quality of the graphics you create on-screen with the **Presentation Pack** will be matched in your hard-copy output. The package supports a wide variety of dot matrix, laser, and ink jet printers, as well as plotters. Hewlett-Packard plotters, however, will not correctly reproduce the 3-D graphs created by **GEM**, so you must convert them to 2-D before plotting. The **Presentation Pack** offers no direct support for



FACT FILE



GEM Graph Presentation Pack, Version 1.1
Digital Research Inc.
60 Garden Ct.
Monterey, CA 93940
(408) 649-3896
List Price: \$495
Requires: 512K RAM,

DOS 2.1 or later.

In Short: This package consists of **GEM Graph**, **GEM Draw Plus**, and **GEM WordChart** all rolled into one. The program is easy to install and use; you directly manipulate objects on-screen so that you see the results of your changes as soon as you make them. There is no direct support for film recorders, but high-quality slides, prints, and transparencies can be produced using the program's link to the MAGIcorp service bureau. Not copy protected.

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PURADOX 2.0	EXCELLENT	EXCELLENT	VERY GOOD	SATISFACTORY	VERY GOOD	EXCELLENT	GOOD	EXCELLENT	8.0
DATA BASE 2.5/3	EXCELLENT	EXCELLENT	GOOD	SATISFACTORY	VERY GOOD	EXCELLENT	GOOD	EXCELLENT	7.8
DATAFLEX 2.3	EXCELLENT	EXCELLENT	VERY GOOD	GOOD	VERY GOOD	SATISFACTORY	UNACCEPTABLE	GOOD	6.6
ADVANCED REVELATION 1.0	EXCELLENT	EXCELLENT	VERY GOOD	GOOD	VERY GOOD	VERY GOOD	UNACCEPTABLE	GOOD	6.2
Base III PLUS 1.1	POOR	POOR	GOOD	SATISFACTORY	EXCELLENT	SATISFACTORY	GOOD	POOR	5.2
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■ DESKTOP SOLUTIONS

film recorders but provides a link with the MAGIcorp service bureau. For a fee, MAGIcorp will turn your *GEM* files into slides, prints, or transparencies; it even provides communications software that will allow you to transmit the files to MAGIcorp over a modem.

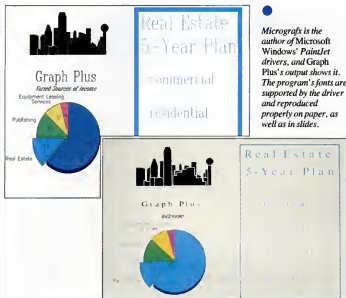
The *GEM Graph Presentation Pack* is an impressive tool that lets you create eye-grabbing graphics with a minimum of effort. It gives you complete control over modifying any part of your graph, but its substantial array of capabilities never gets in the way of easy operation. Few products are such a pleasure to use.

—Robert Kendall

Graph Plus

In its first release in 1987, Micrografx's *Windows Graph* established itself as the first serious business-graphics package for the *Microsoft Windows* environment. In its second release, the program bears a new name—an indication of the extent to which Micrografx has upgraded an already excellent product. In fact, when used with Micrografx's \$695 art product, *Designer*, the new *Graph Plus* (which lists at \$395) may be the single best solution for the design-oriented professional.

Perhaps *Graph Plus*'s most attractive feature is its work area—a matrix that de-



Micrografx is the author of Microsoft Windows' PaintJet drivers, and Graph Plus's output shows it. The program's fonts are supported by the driver and reproduced properly on paper, as well as in slides.

faults to twelve 8½ by 11 "pages." This lets you rearrange things so easily that you feel encouraged to make better-looking charts—and that's what desktop presentation graphics is all about. You can work on charts within single pages, or you can group or drag charts and chart elements from one page to another. You can view the pages individually, or in groups, or zoom in on them, and you can print the pages individually or merge several or all of them to print your graphs in a single presentation on a large printing device, such as an E-size plotter.

Graph Plus's vast array of chart and type styles and intricate capabilities, such as letting you scale the depth of 3-D effects, make it as attractive to the desktop publisher as it is to the graphic artist.

Besides adding new features in *Graph Plus*, Micrografx has made the product easier to use. You will still need to invest some time in learning the program, however. The manual with *Graph Plus* (now broken into two books—a tutorial and documentation) is markedly better than that of *Windows Graph*. Where its predecessor was terribly confusing, this one is adequate. There is still no on-line help, and al-

though most of the program's menus are self-explanatory, the Options menu leaves a lot to be desired.

Graph Plus also allows you to create custom chart types and add them to the program's library, called the Folder. You can save a chart layout in the Folder and later apply the layout to any new data you need to illustrate. In this version, you can also save titles and text with the chart format so that you can now save a complete chart template and simply load in new data. If you know that you'll need to generate monthly reports of sales and earnings, you can develop a chart type, save the template, and change the data each month. Your report at monthly meetings will display the new numbers in the format your audience is used to seeing.

Like most of the graphics software reviewed here, *Graph Plus* cannot automatically update changing titles in a worksheet. If you are importing your data from a worksheet each month, be aware that *Graph Plus* looks at worksheet titles as if they were data and assigns them zero values in your chart. So if your titles will change with each update, count on having to edit the template and rekey titles.



EDITOR'S CHOICE

FACT FILE



Graph Plus
Micrografx Inc.
1820 N. Greenville Ave.
Richardson, TX 75081
(800) 272-3729
List Price: \$395
Requires: 512K RAM,
graphics card supported
by Microsoft Windows (EGA or VGA
required for color), Windows 2.0, DOS 2.0 or
later.

In Short: A serious graphics product for the
Microsoft Windows environment that offers
device support you can't get from the host.
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1 800 247-1212, Ext. 158.

These images were printed using Aldus Pagemaker 3.0 using the DTP&K Laserport Card in conjunction with an HP Laserjet Series II. Effective print resolution is 1200 dpi horizontal and 300 dpi vertical.



AT&T

The right choice.

LEAVE THE DRIVING TO THEM In its continuing effort to make *Windows* a viable solution for the serious business user, Micrografx has gotten into the driver business. *Windows* includes support for an impressive number of devices, including the 8514 monitor, but no support for film recorders. As a result, few *Windows* graphics products can be considered for serious use as desktop presentation programs. Micrografx has addressed the problem by developing its own *Windows* VideoShow driver, which allows *Graph Plus*—or any other *Windows* application you may choose to use it with—to create 2,000- by 2,000-dot-per-inch 35mm slides or to use the VideoShow Presentation System. Micrografx's new PostScript-compatible color driver allows owners of the QMS color PostScript printer to create color output. A driver for the Matrix 4000 line film recorder is due this fall. Note that you can use these drivers with any *Windows* product. Micrografx intends to sell the VideoShow driver alone for \$99.

One of *Windows Graph's* strongest features was the ease with which you could modify your chart layout. By clicking and dragging the mouse, you could move or resize any element of the chart, text, or graphics. With *Graph Plus*, you can group items together, such as a chart and some comment text, so that whenever you drag or resize one element, the others go with it. And you can now rotate text or objects in one-degree increments.

All major chart types except word charts are supported. You can handle text within *Graph Plus*, but its approach is so free-form that we'd recommend you look to another package if text-and-bullet charts are the norm at your company. You can adjust the depth of your 3-D effects and use different colors on the front and sides of the 3-D chart element. Using a toolbox of drawing features, you can make boxes, circles, curves, and lines. Curves and polygons can be smoothed and unsmoothed.

For color-mixing schemes, *Graph Plus* uses both CMY (cyan, magenta, and yellow pure colors) and RGB (red, green, and blue additive and subtractive hues), as well as the typical method of setting hue, lightness, and saturation. Thus, you can customize a virtually unlimited range of col-

ors. You can easily mix colors by clicking on a pure color and adjusting the hue with the scroll bar.

MORE IS MORE Another strength of Micrografx products is access to the company's extensive clip-art libraries. *Graph Plus* gives you a sampling of the available clip art. Another 24 libraries of clip art are available from Micrografx for \$49.95 each. The *Graph Plus* package we reviewed included a coupon for one free library to anyone who registers his copy of

Micrografx is turning Microsoft Windows into a complete product for the graphic artist.

Graph Plus. Also, *Graph Plus* now lets you include bit-mapped as well as vector images in your charts, which you access through the *Windows* Clipboard. This allows you to use paint programs and digitized scanner images to create clip art for your chart. However, be aware that quality could suffer if you use them. Bit-mapped images are fine for paper output, but if you enlarge them, the resolution of the image will suffer. You're better off sticking to vector images.

Windows Graph, Version 1.0, took advantage of *Windows' DDE* (Dynamic Data Exchange) support when virtually no one else did, but the program essentially had no one to talk to until Microsoft's release last year of its *Excel* spreadsheet for *Windows*. Now *Excel* and *Graph Plus* support *DDE* under *Windows 2.0*. *DDE* effectively lets you run applications interactively in the *Windows* environment, transfer information from one program to the next while both are active, and even run one program from within another.

With *DDE*, you can hot-link data across applications running under *Windows*. You can directly link *Graph Plus* charts to data in an *Excel* spreadsheet, for instance. In fact, *Graph Plus* ships with a *DDE* macro that will make the link for you. *DDE* also makes it possible to feed

data to *Graph Plus* over communications lines. Since the early days of *Windows*, Microsoft has been showing an example of what this can mean. In the Microsoft demonstration, a communications package regularly modifies a stock-market graph with data that it is getting from updates on the Dow Jones, bringing the data first into *Excel*, then into a graphics program.

With the new name *Graph Plus*, Micrografx officials say the company wanted to de-emphasize the *Windows* identity of *Windows Graph*. The new name reflects the company's recognition that in the future there will likely be multiple platforms for the development of new software. Nevertheless, Micrografx is in a position similar to that of the early Mac developers. It has chosen an environment that is superior in many ways to the mainstream. But users need business solutions, not just theories about user interfaces. Instead of living with the limitations of their environment, Micrografx developers, like the Mac developers before them, have fixed the shortcomings of the interface and turned them into opportunities. Micrografx's development of its own drivers is evidence of that.

All this makes *Graph Plus* the most significant business graphics product for *Windows* that you'll find on today's market. The seamless ease with which the graphic artist can integrate it with *Designer*, its extensive, inexpensive clip-art options, and its use of *DDE* make it a powerful tool. Micrografx, with its continuing development of drivers for the *Windows* environment, is turning *Windows* into a complete product for the graphic artist.

As confusion continues to surround which operating system to use (*DOS*, *OS/2*, *Unix*, and so on), one of the strongest arguments for choosing a *Windows* product is its ties with both the present and the future. If you upgrade your hardware to a 386-based machine but continue using *MS-DOS*, then *Windows/386* will provide you with power and compatibility. If, however, you make the leap to *OS/2*, you will feel right at home with the Presentation Manager, and retraining costs and time will be virtually nil. You can rest assured that a Presentation Manager version of *Graph Plus* is on the way.

In this release, its first major update

■ DESKTOP SOLUTIONS

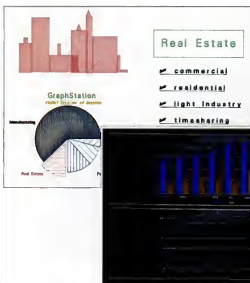
from the old Windows Graph, *Graph Plus* is a winner that makes few compromises with its environment. If your needs are heavy on style and appearance, *Graph Plus*'s easy-to-use graphics tools and object manipulation may fill the bill perfectly.—Philip F.H. Rose

GraphStation

Although easier is often better where software is concerned, it can also be limiting. Users who would rather tackle a relatively complex package in return for a high level of flexibility and a large number of features may want to take a close look at *GraphStation*, from Software Clearing House.

GraphStation is a comprehensive presentation graphics program that offers a large number of features for business users, including an edit module for text graphs; a simple drawing facility; a slide-show facility; the ability to create an impressive variety of graph styles; a full choice of colors, fills, fonts, and line styles; and the ability to move, resize, or orient anything on the screen. This wealth of features bears one of the heftier price tags among the programs we reviewed: *GraphStation* lists for \$795.

The package uses pull-down text menus to lead you through the process of putting together your graphics. The text menus allow you to employ keyboard entry, but unless you want to spend hours



GraphStation has no image library. The cityscape in the plotter output shown here was drawn. The program, nevertheless, produces crisp images in both the plotter output and slide film.

poking your cursor around the screen while creating a graph, a mouse is strongly recommended. In fact, one is bundled with the software. A one-line explanation appears at the top of the screen as each command is highlighted. As a result, the program's context-sensitive help screens are almost redundant.

MODULAR DESIGN *GraphStation* is divided into three main modules: Graph, Draw, and Edit. Graph is used to create and refine a business graph; Draw allows you to create multiple and combined graphs and to add simple line drawings and other effects; and Edit is a specialized module that permits users to create text and x-y graphs.

Rather than permanently connecting each data set with a graph format, *GraphStation* keeps the two divided. Every time you start a new graph or decide to alter an old one, you are asked to select your data and format, each of which you will have assigned its own descriptive name. The package provides you with several basic formats (for pies, bar charts, and so on) to begin with; there are also several sample graphics to work from. Once you have altered a format to suit your needs, it is ex-

remely simple to save that format for use with any suitable set of data.

You can also pull in data from a *Lotus 1-2-3* or *Multiplan* spreadsheet and save altered data back to the spreadsheet. In addition, you can save a completed chart as a drawing rather than as a graph; this allows you to call up the entire graph in one step, and also makes it easier to create multiple or combination graphs.

GraphStation offers an impressive number of ways to alter a chart through its Modify option. For example, you can change colors or grid, fill, and axis styles on the charts; change the font, size, position, or orientation of text; add new text; and even choose an altogether different type of graph (for example, you can instantly change from a bar to a line graph).

In order to save screen space, the menu does not show all the options available until you choose which factor you want to alter; for example, placing the cursor on one of the bars of a bar chart will add to the menu all the options pertaining to the bars. This can be confusing for a new user, and even those familiar with the package will occasionally need to remind themselves of available options by flagging several parts of the chart in succession.



FACT FILE



GraphStation,
Version 3.11
Software Clearing
House Inc.
P.O. Box 38206
Cincinnati, OH 45238
(513) 579-0455
List Price: \$795

Requires: 512K RAM, DOS 2.0 or later.

In Short: An impressive package at a daunting price, *GraphStation* offers good analytical tools and includes drawing and slide-show capabilities (but no image library). You can customize the interface to your individual level of ability. Not copy protected.

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EXOTIC ASPECTS Any special effects (such as merged or combined charts) are added to a chart in the Draw module. However, unlike other programs that will automatically combine two or more charts, *GraphStation* forces you to produce them manually. For example, to produce a merged chart, you must save one of the charts as a drawing and then superimpose the second on top of it, using the program's considerable editing capabilities to erase extraneous legends, add new titles, and make other refinements. This process takes time and patience and is certainly more exacting than working with programs that combine charts automatically, but it also enables you to create a graphics display attuned to your individual needs, rather than having to make do with whatever the program provides. (If you're really rushed, Version 3.11 includes an option called QuickChart, which allows you to key in data and produce a basic business chart in about 10 minutes.)

The package contains many useful and exotic features that can really make for an effective graph. A handy feature called Normalize adjusts for large discrepancies in data; for example, if one store shows sales in the dozens and another in the hundreds, *GraphStation* will automatically scale the second store's figures down by a factor of ten, and will place a legend in the chart attesting to the change. You can also change the user interface among three levels, from beginner to expert, and plot or print your graphs in one of three speeds, depending on whether you need quality or quickness.

Along with its advantages, *GraphStation* does have a few quirks. For example, it has no image library to draw on (although the program developer says one will be coming in the future), nor does it have a framing feature for graphs, although one can be created easily enough in the Draw module.

GraphStation makes full use of the 16 colors available with EGA boards. For users who need additional color output, Software Clearing House sells a companion product called *ImageStation*, which includes all the features of *GraphStation* but also supports the advanced capabilities of the Targa board.

If you're still a bit afraid of playing with

your software, then a friendlier package than this one will probably suit your needs. Still, executives who want to exercise a bit of creativity will find *GraphStation* right up their alley.—Barbara Krasnoff

Harvard Graphics

If you think that producing presentation graphics is more trouble than it's worth, you've probably never tried *Harvard Graphics*. Software Publishing Corp.'s \$495 program is one of the most intelligently designed packages available; it makes creating charts and graphs an almost effortless enterprise.

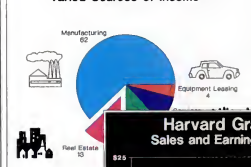
Like most packages in this product category, *Harvard Graphics* lets you quickly graph and chart numerical data and text using default settings. Its approach is menu-driven and object-oriented: you make selections from a series of menus, work with fill-in-the-blank templates to create your charts, and then embellish them with shapes that you construct using graphics primitives.

Harvard Graphics' menu-driven interface is pliant enough to let you handle complex graphics tasks, but if your charting needs are simple, it won't overwhelm you with myriad irrelevant choices. And advanced tools like the package's macro program—which lets you record and play back a series of keystrokes—and batch printing serve experts and novices alike by automating and simplifying repetitive tasks. That's the balance between flexibility and ease of use that any presentation graphics program worth its price should strike.

COMPREHENSIVE OFFERINGS

Harvard Graphics offers a comprehensive array of chart and graph types, including text, pie, bar/line, area, scatter, high/low/close, organization, and multiple charts, and their variants. Although the program does not provide ready-made formats for specialized charts like Gantt, Pert, bubble, and flow charts, you can create these using graphics primitives. Chart design options allow you to combine up to six charts on a

Harvard Graphics
Varied Sources of Income



Harvard Graphics' optional clip-art libraries offer attractive image enhancement. However, the choice of symbols in the basic package, used here, is limited and sketchlike.

Harvard Graphics
Sales and Earnings Growth



■ DESKTOP SOLUTIONS

page, select from six type fonts, reposition and resize your charts, and add boldface, italics, and underline to individual characters, words, and lines. Although you're limited to using one font per chart, you can use several in multiple-chart combinations.

Data entry and editing couldn't be easier. After you've decided which type of chart to create, you enter data in a columnar screen where you also specify titles, legends, and footnotes. Depending on the chart type you choose, you will have to fill out an additional form or two in order to select such options as a 3-D effect, a link between two pie charts, colors or fill patterns, overlapped or stacked bars, grid lines, legend placement, and axis increments.

You can explode slices from a pie chart or add a 3-D effect to it, but you can't do both in one chart. If you want to change your pie chart into a bar chart, for example, you can do so without having to re-enter data by using the Change Chart Type overlay. *Harvard Graphics'* data entry, editing, and options screens maintain a standard and well-organized look. And

you can depend on the program's consistent use of function keys for previewing a chart on-screen, calling up context-sensitive help, adjusting text sizes, or selecting font attributes.

If you choose the bar/line, area, or high/low/close chart format, *Harvard Graphics* can do double duty as an analysis tool; it lets you use 19 keywords to perform arithmetic and statistical calculations, as well as to create four types of regression curves. You can perform calculations on several series or on just one. Having access to this feature means that you won't have to switch back and forth between your spreadsheet program and presentation graphics program when you want to do certain kinds of "what-if" analyses.

Harvard Graphics' data and graphic import/export facilities will save you from needlessly duplicating your efforts. The program can import data and graphs created by *Lotus 1-2-3*, *Lotus Symphony*, and *Software Publishing's PFS:Professional Plan* and *PFS:Graph*. In addition, charts created with *Harvard Graphics* can be exported to *Professional Write* and *Harvard Professional Publisher*, as well as to programs that read .CGM files. (Before you can export or import metafiles, however, you need to install certain Virtual Device Interface drivers from the *Harvard Graphics* utilities disk.)

Harvard Graphics' image-export files can work with desktop publishing programs, such as *PageMaker* and *Ventura Publisher*, Version 1.1, that read encapsulated PostScript files or Hewlett-Packard Graphics Language, although the vendor notes that images created with *Harvard Graphics* may look different after they've been exported. The program can also read data directly from ASCII files that are less than 256 characters wide, or from delimited ASCII files.

LINKING YOUR DATA Even with the clearest instructions, importing data and titles takes some practice. I was able to import a *Lotus 1-2-3* test file without much difficulty, but I did have to massage the data a bit once it was in *Harvard Graphics'* Chart Data form. Still, the program's import/export facilities are easier and more convenient to use than those of many other packages, and they're well worth the time

it will take you to get used to them.

Also a big time-saver is the program's automatic data-link feature, which lets you join a *Lotus 1-2-3* worksheet or ASCII file to a chart template. When you get the template, the program imports the data from the designated file, using the same instructions time and again so that the chart maintains a consistent appearance even if its data has been changed. You'll find tem-

Harvard Graphics' data and graphic import/export facilities will save you from duplicating your efforts.

plates useful even when you don't need to import data, and you can create them for just about every chart of a style you frequently use. In addition, you can set up a template so that it includes annotations and graphics.

Just as *Harvard Graphics'* import/export options should prove adequate for most users, so should its support of peripherals. The package works with mice from several manufacturers, as well as the Kurta IS/ONE-Series Tablet. Whether your output medium of choice is 35mm slides, overhead transparencies, or paper, you'll find the program compatible with an excellent range of devices: film recorders and video devices; dot matrix, ink jet, thermal, and laser printers; and plotters. Printers and plotters can use 12 fill patterns; color printers can use 6 colors plus black, and slides can use up to 16 colors.

Although *Harvard Graphics* offers three levels of output quality (draft, standard, and high), you may find that your printer supports only one or two of these. And when I tried to print a full-sized chart at high quality using the Hewlett-Packard LaserJet Series II, my printer didn't have enough memory to complete the task; so I had to choose a smaller chart size.

You'll appreciate the option of using *Harvard Graphics'* ScreenShow facility and your monitor to create desktop presen-



EDITOR'S CHOICE

FACT FILE



HARVARD Graphics,
Version 2.1
Software Publishing Corp.
1901 Landings Dr.
Mountain View, CA 94039
(415) 962-8910

List Price: \$495; upgrade from *Harvard Graphics*, Version 2.0, \$50; upgrade from *Harvard Presentation Graphics*, \$150.
Requires: 512K RAM, DOS 2.10 or later.
In Short: The de facto standard among presentation graphics packages, *Harvard Graphics* offers easy-to-use standard formats for creating and editing commonly used business charts. Advanced features like macros, batch printing, and data links to *Lotus 1-2-3* spreadsheets automate and simplify repetitive tasks complementing the package's user-friendly menu structure. A spelling checker, a ScreenShow feature, and connectivity to many popular programs add even more power. Not copy protected.

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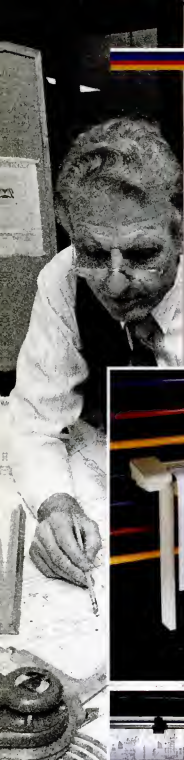
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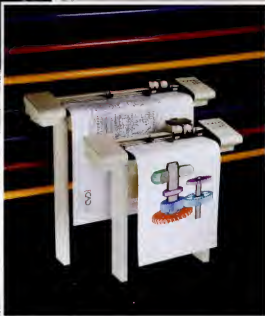
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■ DESKTOP SOLUTIONS

tations. ScreenShow lets you choose the order in which your slides will appear, how long they will remain on-screen, and how they will be removed from the screen. A ScreenShow Effects menu, which lists the charts that will appear on-screen, is where you'll enter your draw (display) and erase (remove) directions, with transitions and display times for each slide. Transition choices include wipe, scroll, overlay, fade, weave, iris, and rain effects, among others. You can also create a menu and paths for a screen show, allowing viewers to select the part of the show that they wish to see.

MENDING Ps AND Qs A 77,000-word spelling checker, based on the same Soft-Art dictionary and engine used in *Professional Write* and *PFS:First Choice*, goes a long way toward separating *Harvard Graphics* from its competition—and separating you from your typing errors. Not only does the spelling checker identify words it cannot find in its master dictionary, words that are capitalized incorrectly, words and numbers that are punctuated improperly, and words that are repeated in succession, but it lets you create a personal dictionary of often-used special words, much as a word processor's built-in spelling checker would.

As useful as it is, *Harvard Graphics'* spelling checker isn't without faults. It won't let you proofread as you type, nor will it let you check the spelling of particular words on the fly. If you realize that you've failed to correct a misspelled word after the spelling check has been completed and you try to recheck your file, you'll receive the message "spelling check is complete" rather than an overlay box that identifies the error. Of course, you can correct mistakes by editing your chart or by exiting the program and starting again, but that defeats the purpose of using a spelling checker in the first place.

THE ART OF IT *Harvard Graphics'* Draw/Annotate features are fairly robust and should meet most of your needs. However, you cannot zoom in on your chart in the Draw mode. You can add text or objects (such as circles, lines, polygons, and ellipses) to your charts and stylize these with fill patterns and drop shadows.

Grid lines and "snap-to" lines make freehand drawing a more precise art. You can move, resize, copy, delete, and group objects, but you can't rotate or mirror them or flip their axes as you can with some other packages.

Harvard Graphics' main weakness is its standard clip-art library, which contains approximately 300 symbols. There are too many symbols that look as if they've been rendered by some graduate of a matchbook-cover cartoon school, and still more that should be part of the package's standard repertoire but aren't. Among the most-professional-looking symbols the package offers are 20 national maps and 18 city maps, arrows, upper- and lowercase Greek alphabets, and flowchart icons.

Clip-art fans don't have to settle for the symbols in *Harvard Graphics'* standard library. An optional accessory product, *Business Symbols* (\$99), provides more than 300 additional symbols, including those for computer and telecommunications equipment, three-dimensional objects, food packaging, office equipment, industrial buildings, traffic signs, and more. Of special interest to scientists and engineers are the mathematical, chemical, and element symbols, which dovetail nicely with the Greek alphabets. If you need to drive your point home with clip art, then you should seriously consider purchasing this symbol set; with only a few exceptions, its symbols are of higher quality and should prove to be more useful than those that come with the package.

OTHER OPTIONS In addition to *Business Symbols*, Software Publishing offers four other accessory products. *ScreenShow Utilities* (\$149) is a set of three programs with which you can capture EGA text or graphic images and save them in .PCX format for inclusion in *Harvard Graphics* screen shows; you can display your screen shows without running *Harvard Graphics*, and you can copy a screen show from one disk or subdirectory to another. *U.S. MapMaker* (\$149), a database of state outlines and city coordinates, lets you create customized color-coded maps, complete with legends and descriptive text, and then save them either as charts or as symbols. *Quick-Charts* (\$99) is a collection of 125 frequently used business

charts and matching templates. And *Designer Galleries* (\$149) offers sample charts, matching templates with optimal enhancement choices, and color palettes.

Of course, these accessories are just icing on an already rich cake. An impressive package even in the days when it was called *Harvard Presentation Graphics*, Software Publishing's program just keeps improving with age.—Robbin Juris

Image Builder

Communication Dynamics' *Image Builder* does not display 3-D charts, provide slide-show capabilities, or even directly support output to many common printers and plotters. For \$99, it does let you easily and cheaply produce attractive, two-dimensional on-screen graphics and high-quality 35mm color slides, 8- by 10-inch transparencies, and color prints via the MAGIcorp slide service bureau.

A nearly effortless installation procedure and, optionally, the addition of a mouse device driver to your AUTOEXEC.BAT file are all that's necessary to get *Image Builder* up and running. Although a mouse is not really needed, you'll find that it makes everything that much easier, from clicking on menu choices to drawing a line.

A quick, manual-based tutorial helps even first-time graphics users grasp the basics of *Image Builder* right away. The manual also devotes one chapter to good design technique and another to changing color palettes and importing files. Beyond that, the manual is startlingly brief. Some of the features are only touched upon, while others are not mentioned at all.

Luckily, *Image Builder's* Lotus 1-2-3-style moving-bar menu is a familiar enough interface, making you feel right at home as you experiment with the various menu options. If you get totally confused, hitting the F1 key will bring up a context-sensitive help screen.

SHORT BUT SMART The product's file import abilities are intelligent, but limited—only .CGM and 1-2-3 .PIC, .WK1, and .WKS formats are supported. To create most types of graphs (except for text or flowcharts) or to import data from a 1-2-3 .WK1 or .WKS file (which *Image Builder*

■ DESKTOP SOLUTIONS

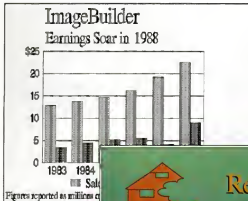
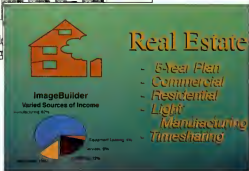


Image Builder produces fine slides but does not support many common printers and plotters. The paper output shown here was produced on an HP LaserJet using an Epson emulation.



quikily terms NewLotusWorksheet and OldLotusWorksheet), you must select the program's Chart option from the main menu.

Though the data I had input manually when creating my own charts graphed correctly, data from Lotus 1-2-3 worksheets did not always import correctly. Part of the problem is that *Image Builder* can import only six columns and 50 rows of spreadsheet data. Also, unless years are entered as labels, they may translate to numbers when imported. If you are importing files, take care to format your spreadsheet properly before bringing the data to *Image Builder*.

Whether importing or entering data, you'll find it is immediately turned into the program's default graph type, a basic vertical bar chart. But you can easily change that by selecting one of the program's other chart types, which include basic or stacked horizontal bar graphs; stacked vertical bar graphs; line, area, or mixed graphs; scatter plots; and pie charts. Though there are no predefined chart types for text and flowcharts, you can create

them yourself using the program's graphics primitives and text entry capabilities, available under the Draw menu option.

Legends can be toggled on or off and set to appear inside or outside the chart. Labels (including main titles, subtitles, and x- and y-axis titles) are entered in a predefined format in the Chart menu; you can then alter their font and color attributes. If you need to do more editing, merely save the chart, switch to the Draw menu, and select the AddChart option to call the saved chart onto the screen. You can then change other colors or fonts, create drop shadows, move, rescale, rotate, warp, copy, or otherwise alter the text and graph to your heart's delight.

A nice option lets you move back into the Chart menu, change your data, and then replace a chart in the Draw menu with the new graph. The new chart is automatically scaled down to the size of the one it replaced.

The colors in the default palette are rather unappealing on-screen; even though the program manual specifically states that red and green should never be used in the

same chart, the default vertical bar colors are indeed red and green. Fortunately, even graphs created using these colors are tolerably pleasing when converted to slides. You don't have to settle for the default palette, though. Changing colors in *Image Builder* is a snap, and the other available palettes offer far more acceptable choices.

DESIGNER COLORS Once you've settled on a palette, you may still have qualms about some of the colors. If that's the case, you'll be pleased to find that you can actually design your own colors by remixing the hue, saturation, and intensity of a color or altering the RGB values. Up to 16 colors can be displayed at one time on an EGA or VGA screen.

You can add clip art to your charts via *Image Builder*'s SSymbols library. With only 48 symbols, the library is somewhat sparse; however, the new *Image Builder Library*, which sells for \$75, adds 50 symbols to the collection. In any case, you can modify or even add to the program's library on your own; although *Image Builder* doesn't support any real freehand drawing à la *MacPaint*, you can make simple drawings by accessing the lines, boxes, circles, and polygon functions.

Image Builder's lack of extensive font options is something of a mixed blessing. Only Helvetica Light, Bold, and Italic

PC
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**Image Builder,
Version 2.0**
Communication
Dynamics Inc.
7300 SW Hunziker,
#200
Tigard, OR 97233
(503) 684-5151

List Price: \$99

Requires: 512K RAM, DOS 2.0 or later.

In Short: Easy to install and use, *Image Builder* offers an acceptable selection of chart types and lets you customize your color palette. There are no 3-D capabilities, and device support is limited, but the program's link to the MAGICorp slide service bureau helps to compensate. Not copy protected.

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PIECING COMPONENTS TOGETHER CAN BE A BIG MISTAKE.

The Canon Express Desktop Publisher is a totally integrated system. So when you turn it on, it won't turn on you.

With most desktop publishing systems you pick a PC from one company, a printer from another, an image scanner from a third, and then pray for compatible software. Now Canon puts it all together for you, with a turn-key system that anyone can master.

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copy to look at your work.

We give you a true WYSIWYG environment from start to finish. You have nine zoom levels, with editing in each. Plus a built-in, full-function word processor, which means you don't have to exit one software program to enter another and make revisions. Complete integration. And you can do it all incredibly fast, thanks to our new 80386-based PC.

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In Utah, 1-800-922-3131.

Canon
Canon Express Desktop Publisher



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fonts, as well as a Serif font, are available. While this can help new graphics users by restraining them from cluttering up a chart with too many fonts, it is a definite hindrance to more-experienced users who want to mix and match their own font styles.

One of *Image Builder*'s most glaring limitations is the lack of any fill patterns to add emphasis to your charts. You can choose only to have the objects in your chart appear hollow or solid.

Though the package is slated mainly to produce slide output (where fill patterns may be extraneous) as well as draft-quality-only output from Epson or Epson-compatible devices, the program's support of other printers and plotters via third-party CGI device drivers demands the addition of fill patterns. The forthcoming *Image Builder Library* will also include its own CGI device driver, and this only makes the present lack of fill patterns more offensive.

Once you've created your graphs, you can transmit them to the MAGIcorp slide service bureau via *Image Builder*'s telecommunications facilities and a modem. You'll need to get a site code; and you'll have to fill out an order designating the files you want transmitted, how many slides or transparencies of each file you'll need, and the priority of the order—either normal or rush. On a business day, normal-priority images sent before 12 noon Eastern time and rush-priority images sent before 5 P.M. Eastern time are shipped the same day. Images sent normal priority cost \$5 per slide, \$8 per overhead transparency, \$7 per color print, and \$5 per black-and-white paper print. Rush orders are one and a half times the fee of normal orders. There is also a \$10 imaging fee for each transmitted image.

STELLARSLIDES You won't be disappointed with the slides you create with *Image Builder*. The slides we received from MAGIcorp were outstanding, distinguished by crisp definition and subtle background shading.

Image Builder can't satisfy everyone's needs. The limited number of fonts, lack of fill patterns, and weak output device support are enough to send some users running straight out to buy a more powerful package, like *Harvard Graphics*. But if

you need to create handsome-looking 35mm slides without a lot of fuss, *Image Builder* can do the job admirably.

—Jennifer Zaino

Lotus Graphwriter II

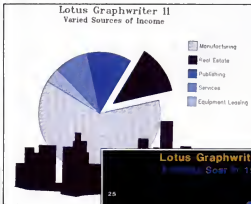
Automatic charting and the Lotus trademark are the two hottest players on the team of *Lotus Graphwriter II*, Version 1.0 (a Lotus Development Corp. program that, like Lotus's *Freelance Plus*, sells for \$495). *Graphwriter II* shares the Lotus name, as well as its look and feel, with a number of well-known programs from the software giant, most notably the top-selling spreadsheet *Lotus 1-2-3*. But when it comes to automated charting, it's in a league by itself.

Designed for spreadsheet and database users who need to create high-quality graphics on a regular schedule, this easy-to-use program offers truly big-league automation: automatic chart creation, automatic updating of charts to reflect changes in spreadsheet data, automatic formatting, and automatic printing of up to

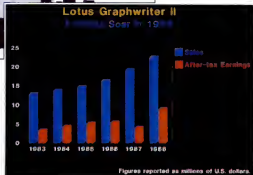
100 different charts in one run. But the program is not just a one- or two-star team. Its "bench" is strong, with 24 different chart formats (including scatter, bubble, org, and Gantt), font choices and stylistic options, comprehensive support for output devices, the ability to insert *Freelance Plus*'s graphics to enhance its charts, the ability to angle your x-axis labels, and strong importing and exporting capabilities.

FOR NUMBER-CRUNCHERS Users with artistic aspirations—and more interest in making a visual statement than in saving time—should look elsewhere; other programs offer more artistic control and fancy flourishes. Freehand drawing? Forget it. WYSIWYG? Uh-uh. Sizing and moving chart elements? Not really. Symbols? Only if you import them from *Freelance Plus* or create .DRW files to import.

Since *Graphwriter II* puts the emphasis on data, not drawing, you cannot manipulate the charts directly—either by pointing at certain chart elements or by dragging and placing them. The only input device



Though its strength is data manipulation, Lotus Graphwriter II supports a variety of output devices for presentation purposes, including plotters, printers, and film recorders.





Quick-turn the page.

■ DESKTOP SOLUTIONS

supported other than the keyboard is a mouse, but you can use a mouse only to access the menus and make menu choices.

As with other packages that don't allow you to manipulate the graphics directly, you see *Graphwriter II*'s charts only after you've made choices and entered information on a series of screens. You can, however, stop and ask the program to plot the chart (previewed on screen or produced on an output device). If you want to make

Batting a thousand in the automation game, Graphwriter will generate monthly charts from your data.

changes after you view the chart, you must return to the screens, and the chart disappears until you ask *Graphwriter II* to plot it again.

The approach to creating graphics is where *Freelance Plus* and *Graphwriter II* go their separate ways. Lotus, which is near the top of the market with these two programs, tags *Freelance Plus* as a more free-form graphics program; it's designed to let users do more conceptual graphics creation and more hands-on graphics styling. *Graphwriter II* is aimed at number-crunchers who need data-driven charts and who have little time or inclination to work with artistic elements. The payoff is ease of use and automation.

LOOK, MA, NO HANDS High-volume production environments are where *Graphwriter II* really shows its stuff. Importing data from *Lotus 1-2-3*, *Symphony*, and *Freelance Plus* is as easy as you'd expect, but it's also a cinch to import *dBASE III* files, as well as files in .DIF, .SYLK, and ASCII formats. Showing off its data-oriented charting strategy, *Graphwriter II* can handle up to 435 data points on a chart (remarkable!). The Data-link lets you set up and preserve links to spreadsheet or database files. If you change your data files, *Graphwriter II* can automatically update

your charts to reflect those changes. If you like, you can also view your spreadsheet data on-screen while using the graphics program.

Batting a thousand in the automation game, *Graphwriter II*'s Autochart feature will produce your charts on a regular basis without requiring any more from you than setting up the system once and for all. You simply tell the program where your data is stored, select chart type and attributes (or use *Graphwriter II*'s fine default settings), create the Autochart list, and select your output options. Forever after, *Graphwriter II* will generate charts from your data—for example, to produce charts of monthly sales figures and forecasts automatically. Also, you can print as many as 100 charts—again automatically—with a single command. Charting data couldn't get much easier.

LOTUS LOVERS, TAKE NOTE Users of *Lotus 1-2-3*, *Symphony*, and *Freelance Plus* will feel right at home using *Graphwriter II*. As with 1-2-3, you get easy installation, comprehensive manuals, and Lotus customer support. You also get the familiar 1-2-3-style menus, displayed across the top of the screen. You move through the menu choices by using the cursor keys to highlight your choice and then pressing Enter, or by typing the first letter of the selection. When you highlight a command on the top line, another series of commands appears on the second line. Choosing File from the top line, for example, shows you the second-line choices of Retrieve, Save, Export, and so forth.

Below the menu line at the top of the screen is a lighted band of text, called the banner, announcing what type of information is required, which form in the series of forms is being displayed, and what action to take. When you move to the style boxes on the screen forms, pressing the Spacebar produces pop-up forms that offer additional choices (colors, fonts, fill styles, positions, 3-D effects, and so forth). Status information (basic information about the current file, chart type, and output device) appears in the status line, displayed at the bottom of the screen.

In addition to using the menus and the screens, *Graphwriter II* makes full use of the PC's keyboard. The function keys, for

instance, perform various tasks. Most notably, the faithful, familiar F1 yields the context-sensitive Help system. Also, you can access the program's Autochart capability directly from the DOS prompt with a single command.

GOOD-LOOKING OUTPUT *Graphwriter II*'s flexibility and its range of options make for good-looking if unexciting output using the program defaults or your own choices—just fine for straightforward business presentations. In fact, importing the city skyline symbol from *Freelance Plus* (by using *Graphwriter II*'s Merge .DRW command) made our exploded pie chart look so spiffy that one PC Labs software tester was surprised to learn it was the product of *Graphwriter II*. The program wouldn't allow us to create a combined line-and-bar chart required for our tests (you can produce a line/bar chart in *Graphwriter II*, but with only one set of bars and from one to seven lines); we were able to produce a line chart and a bar chart side by side.

The list of output devices that *Graphwriter II* supports is up-to-date, including PostScript support as well as Matrix MVP output. You can include your charts in *Lotus Manuscript* and certain desktop publishing programs by first saving your charts as metafiles.

PC FACT FILE



Lotus Graphwriter II
Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
(617) 577-8500
List Price: \$495
Requires: 512K RAM,

DOS 2.1 or later.

In Short: Emphasizing data, not drawing, this easy-to-use program offers automatic chart creation and a direct link to spreadsheet data. Though not for users who want artistic freedom, it offers 24 chart types, font and stylistic options, good output device support, and strong importing and exporting, plus up to 435 data points on a chart. Not copy protected.

CIRCLE 66 ON READER SERVICE CARD



That's how much effort it takes to turn data into graphs with Graphwriter II.

Actually, it may take even less effort than that. You see, Lotus® Graphwriter® II is the only graphics software that lets you automatically generate large quantities of quality graphs based on current spreadsheet and database information. All with a single command.

Do you regularly need to create a variety of graphs from continually changing data such as daily inventory, monthly P&L or quarterly head count? With Graphwriter II you can create a direct link to data in your 1-2-3,* Symphony,* dBase* or ASCII files. So whenever you update your data, you can automatically update your graphs with a single command. What's more, with one keystroke you can toggle back and forth between your data source and Graphwriter II to view and select the data to be graphed. No more printing out files and time-consuming rekeying.

Graphwriter II is a full-fledged production system. You can automatically output up to one hundred charts at a time with a single command. You can even print multiple charts on a page.

And Graphwriter II offers you 24 different graph types—more than any other PC graphics package. So you can choose the chart type that best represents your data.

What's more, you have control over hundreds of style settings such as type font, heading location, bar width and color.

So if you need to create and frequently update graphs from ever-changing data, you need Lotus Graphwriter II.

To get a free self-running Graphwriter II demonstration kit, call 1-800-345-1043 and ask for demo kit AFC-2524, for 5.25" format, or demo kit AFC-2664 for 3.5" format.*

Then you can turn this page too.

Lotus Graphwriter II

Lotus Graphwriter II





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■ DESKTOP SOLUTIONS

ANSWER YES OR NO The fact that you can't apply your artistic hand to the charts you create with *Graphwriter II* can be either a plus or a minus—depending on your style. If you're a frustrated Julian Schnabel, David Salle, or Elizabeth Murray, forget it. But if you're the overworked head of the understaffed sales department, with no time to update your presentation graphics each time your revenues rise, you'll want to remember the name *Graphwriter II* when you submit your next software requisition.

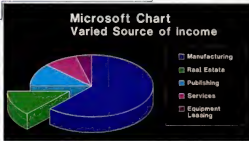
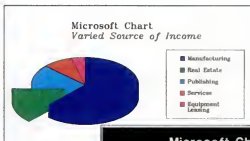
If you're still unsure, see how many affirmative answers you make to the following statements. Your business requires spreadsheet data graphed accurately, routinely, and attractively, and you lack a graphics department to create the graphs (yes?). You need your charts kept up-to-date, linked directly to your spreadsheets and databases (yes?). You have more pressing (and more enjoyable) activities scheduled than playing around with graphics options (yes?). You're no Michelangelo, not even a Keith Haring (yes?).

And, yes, you know there must be a better PC tool for charting spreadsheet and database data. You've tried producing charts with *Lotus 1-2-3*—with drab, uncaring results. You've seen graphic artists use complex professional graphics software—with too much effort, skill, and time required. You want a program that can graph your data attractively, yet still link your charts to your spreadsheets and, better yet, produce them with little effort on your part. Right? Then *Graphwriter II* is in your ballpark.—Carol Olsen Day

Microsoft Chart

Microsoft Corp. is well known for its contributions to the graphics segment of the software industry. It put a graphical interface on word processing with its release of *Microsoft Word* and brought that interface to the world of DOS at large with its release of *Microsoft Windows*. It made a name for itself in graphics software as well, with its release of *Microsoft Chart* in 1984. *Chart* was the first serious graphics program to run under DOS. It was the program that showed us what our 1-2-3 .PIC files ought to be.

In fact, the software giant's \$395



graphics program could be called the progenitor of all the programs you are reading about in this issue. At the time of its release, it was considered the most powerful and innovative graphics program on the market. Its pop-up menus resembled those found in *Word*. It supported a mouse and tapped Microsoft's voluminous library of device drivers. There was little that you could hook to your PC that *Chart* would not run.

BEATEN TO THE DRAW Over the years, *Microsoft Chart* has been beaten to the draw by its competitors. True, *Chart* still offers a wealth of commands to help you manipulate your data, a generous helping of chart types from which to choose, and Microsoft's remarkable support for output devices. However, *Chart* cannot perform the fancy footwork that its comparably priced competitors can.

Microsoft Chart has no drawing capabilities. You cannot import graphics symbols, and the program will not let you print graphs in a batch mode. Those deficiencies do not keep it from being a capable graphics program, but they do keep it out of the big league.

Installing *Microsoft Chart* is simple. You enter the setup program, answer the appropriate prompts, and watch the program as it works. *Chart* creates a subdirec-

tory and copies all the files you'll need to create and output your graphs. It does not copy the tutorial disk; *Chart* thoughtfully leaves that to you. If you want the tutorial on your C: drive, you'll have to copy it over separately. If you don't want it, *Chart* spares you the effort of having to erase it later.

Chart's menus will make *Microsoft Word* users will feel right at home. You select the Transfer command to load or save a file and, where *Word* offers a "gallery" of style sheets, *Chart* gives you a gallery of chart type selections. Unless you are familiar with the menu structure, you may find it a bit enigmatic, since Load and Save are hidden under the Transfer command and are not immediately apparent.

Chart gives you several ways to access the commands, and unless you keep your hand on the mouse, that can also be confusing. All commands can be accessed with the mouse, but *Chart* gives you other options that are not always consistent from menu to menu. Most selections can be made either by entering the selection's first letter (as in G for Gallery) or by tabbing to the selection and pressing the enter key. However, other menus require hitting the Right Arrow key to get to the selection. These methods are mutually exclusive, and users are well advised to stick with the mouse. Otherwise they will either have to

Microsoft *Chart* supports a wide range of devices, and service bureaus have no trouble producing its slides. Paper output shown here was produced on the HP PaintJet.

■ DESKTOP SOLUTIONS

memorize which methods work with which commands or fumble their way through each selection. In practice, since most users will have a mouse, this will be a minor annoyance that many will not even notice. Nevertheless, the inconsistencies are less than elegant.

IN THE MODE *Microsoft Chart* presents the user with two distinct modes: List and Chart. Each has its own set of commands, though some commands appear in both modes. In the List mode, you can generate the raw data either by inputting it directly or by importing it from an external file. You set the graphing environment by defining default values for output device, chart type, and fonts, and you manipulate the data by defining the format or calculating such mathematical functions as the average, standard deviation, and logarithmic least-squares regression. Then from the Chart mode, you actually design your charts by locating, repositioning, and resizing objects; retyping the chart; changing fonts and line characteristics; overlaying charts; and outputting your charts to a variety of devices.

Chart offers eight basic chart types, ranging from bar graphs to scatter charts, and it can deliver them in variations like 3-D and exploding views. You can also mix and match the basic chart types to create a

multilayered or split-page chart. Selecting the Gallery option in either mode produces graphic representations of each chart type. Unlike *Harvard Graphics*, *Chart* allows you to change the chart type at any time. This flexibility lets you view how your data will appear in various types of charts so that you can easily decide on the type that best shows off your work.

Although *Chart* can import external files such as *Lotus 1-2-3* and *dBASE*, the actual process is not what you would call seamless and may prove to be more cumbersome than just reentering your data within *Chart*. But this is not unusual in graphics programs. Most of the programs we reviewed lacked finesse when it came to handling imported data.

Chart assumes that you are importing only data values and their labels. If the coordinates you specify also contain titles and miscellaneous labels, *Chart* will think they are valid data series and will attempt to chart them. Your best move is to import only your data and enter the title and labels manually. On the plus side, *Chart* will let you link charts to outside data files. While the link is not dynamic (it does not automatically reflect any changes you may make in the data), it does give you a means of maintaining a connection between files.

Chart lets you create an overlaid chart with ease because it lets you select from various data series and chart types. When you link the charts, you can use the same axes or have two vertical axes—a nice, flexible feature. You can easily work with two charts at the same time by splitting the screen into separate areas, moving from screen to screen, and making the selections you need.

Chart supplies drivers for most popular printers and plotters. Its drivers include one for the Apple LaserWriter, which should work with any PostScript-compatible laser printer. If you need slides, you'll find support for the Polaroid Palette and the Matrix PCR Film Recorder. Although you initially install a specific driver during setup, you can select another at any time from within the program.

Chart comes with a tutorial disk that takes you through all of the basic features. However, it stops with the creation of complex graphs, so you should expect to delve into the manual for guidance on

some of the more-difficult procedures.

Like a wine that has aged well, *Microsoft Chart* is familiar and has substance. But where it was once considered innovative, it is now about average. *Microsoft's* one-time graphics heavyweight is a little flabby by today's standards. While others, like Software Publishing Corp.'s *Harvard Graphics* and Ashton-Tate's *Draw Appause* have added impressive symbol libraries and clip art, VideoShow support, and even word processors to help you edit your graphics text, *Microsoft Chart* hasn't developed with the times.

—Vincent Puglia

Nimbus

Media Cybernetics has made its mark in the graphics market with its *Halo Graphics Tool Box* (a programmer's tool kit) and the variety of graphics applications that have sprung from it, such as the popular paint program *Dr. Halo III*. *Nimbus* brings the *Halo* environment to charting software—and also offers a purchasing alternative to companies interested in buying a package in large quantities.

FOR CUSTOM GRAPHICS *Nimbus* is not available as an off-the-shelf product. It is marketed under either a site-licensing agreement for 100 or more copies or an OEM agreement for 10,000 or more copies. The base price at the site-licensing rate is \$195 for each copy. Media Cybernetics customizes the program to your specifications and provides documentation for the tailor-made product. The amount of customization you want determines the final price. Training is available as part of the contract; the update policy and amount of support you get are also negotiable.

Media Cybernetics does offer a *Microsoft Windows* implementation of *Nimbus* called *WinGraph*, which it markets as a conventional end-user product for \$99.95. *WinGraph* does not support film recorders, however, and this fact excluded it from consideration in our graphics block-buster.

The version of *Nimbus* we received for review is the standard evaluation version that the company sends to prospective licensees. It consisted of a low-end graphics program with some makeshift, unindexed

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FACT FILE



**Microsoft Chart,
Version 3.0**
Microsoft Corp.
16011 NW 36th Way
P.O. Box 97017
Redmond, WA 98073-
9717
(206) 882-8080

(800) 426-9400

List Price: \$395

Requires: 320K RAM, DOS 2.0 or later.

In Short: The early standard in business graphics programs, *Microsoft Chart* has not aged well. Although it offers an impressive list of device drivers, you won't find capabilities like full-featured word processing and slide shows, which you'll find in the more robust products on today's market. Not copy protected.

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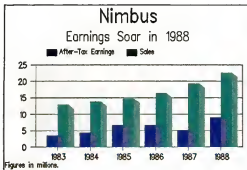
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Film recorder drivers are among the items customized for Nimbus. The basic package supports printers and plotters. The HP PaintJet produced the output shown here.

documentation. The capabilities of this version were quite limited, but Media Cybernetics explained that this was the base version, which the company will customize in accordance with a customer's orders.

The user interface has a data entry screen and a number of screens for altering various graph attributes. A function-key-driven menu lets you switch from one

To alter even a single print option in Nimbus, you must go through the entire setup and reselect everything, including computer, graphics card, and input device.

screen to another, or display or print the current graph. There's no context-sensitive help, but when you place the cursor on an attribute field in one of the screens, a prompt appears with an explanation of the field. In the basic version, it was not always obvious what screen you should call up when you want to tinker with an aspect of your graph; I found myself doing a lot of hunting through one screen after another.

The base version of *Nimbus* is rather weak in its data importing capabilities. It brings in only ASCII and .DIF files and

can't handle labels or titles. You may also run into problems when you type in your own labels or titles, since the program imposes rather stingy length limitations on them. Another annoyance is that x-axis labels aren't displayed in the data entry screen, making it harder to keep track of what's what when you edit data. One nice feature, though, lets you copy individual data sets from one graph to another.

Nimbus supports all types of bar graphs, as well as pie, line, area, scatter, high and low, Gantt, and word charts. For your line and scatter graphs, you have a good assortment of line types and data point symbols. But the only way to produce a line chart with data point markers is by creating two identical data sets in your chart and specifying that one should be plotted as a scatter chart and the other as a line chart.

You have most of the standard options available for altering such things as borders, grids, and axis scaling. You'll probably make good use of the scaling option, since the increment value for the y axis doesn't automatically default to one that logically reflects the range of your data. On the positive side, you can plot data against two independent y axes simultaneously. The program can also automatically generate x-axis labels consisting of the names of days, months, or other units. Another big plus is that you have access to all the colors supported by your graphics card (up to 256 on a VGA).

THE HALO EFFECT The package's limitations become particularly prominent when it comes to adding text annotations.

Although you can position them wherever you want, you're restricted to only three annotations, each no longer than a single line of 24 characters.

Nimbus has no draw or paint capabilities of its own. According to Media Cybernetics representatives, one customization they commonly perform incorporates the capabilities of the company's paint program, *Dr. Halo III*, into *Nimbus*. *Dr. Halo* gives you a great deal of flexibility in changing colors and fill patterns, as well as cutting and pasting, sizing, or rotating portions of your graph. It also lets you create graphics primitives quite easily and has a freehand drawing mode. Its text mode enables you to overcome the length limits that *Nimbus* imposes on text.

Paint programs are more difficult to work with than the object-oriented drawing facilities usually found in business charting packages. Since paint programs are pixel-oriented, you generally must edit a section of the screen rather than a specific object. This makes it all too easy to end up inadvertently altering something you hadn't intended to change. Another drawback to the *Halo* environment is that Media Cybernetics doesn't offer any sort of symbol library. If you want pictures to go with your graphs, you will unfortunately have to draw your own.

In our tests, *Nimbus* fell short of its high-end competitors most noticeably in

FACT FILE

Nimbus, Version 2.0
Media Cybernetics Inc.
848 Georgia Ave., #200
Silver Spring, MD
20910
(800) 446-HALO
(301) 495-3305
List Price: \$195 per unit
(for a minimum of 100 units).
Requires: 512K RAM, DOS 2.0 or later.
In Short: Since *Nimbus* is designed to be customized according to the customer's specifications, there is much that you won't find in the basic package. There are no downloadable fonts nor a symbols library, and support of output devices is spotty. Not copy protected.

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The screenshot shows a spreadsheet with columns labeled A, B, C and rows numbered 10 through 28. A data table is visible with headers 'DataTime Jan/86 Feb/86' and rows for 'SALES', 'COST', and 'GROSS_MARGIN'. To the right, a 'HELP Messages' window is open, displaying text about the 'New Control Screen' and 'Live help' features. The messages explain how the message line describes the nature of the problem and how the call pointer is updated to reflect the current pointer position. It also mentions data validation criteria and validation messages.

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■ DESKTOP SOLUTIONS

the quality of its output. Although it supports a variety of fonts in 50 different sizes, the appearance of the type was not crisp. Even an HP LaserJet produced output that looked as if it had come from a dot matrix printer. The edges of pie charts also appeared ragged. And Media Cybernetics supports no downloadable fonts.

Nimbus presents other problems when it comes to printing. Changing printers—or any of the numerous printer default options—requires running a setup program. To alter even a single option, you must go through the entire setup routine and reselect everything, including your computer, graphics card, and input device. Getting usable output required a good deal of experimentation with printer defaults.

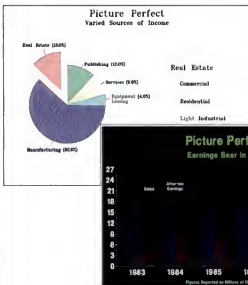
CABLE COMPLICATIONS Media Cybernetics supplies a driver for the Hewlett-Packard 7475 plotter, but in our tests it did not work with the plotter's standard cable. You must make arrangements with Media Cybernetics company to obtain a custom-built cable with the proper pin layout. Files created by *Nimbus* can be used to produce QVP matrix output for film recorders, but those altered by any *Dr. Halo III* functions cannot. Both products support the Calcomp ColorMaster film recorder.

For anyone buying a graphics package in large quantities, the low base price of *Nimbus* makes it a much cheaper alternative than most other products on the market. The customization option may also make it attractive to users with very specific needs. This product would require a great deal of doctoring, however, to bring it into the league of the major players. And you would probably just have to live with the poor quality of the output.

—Robert Kendall

Picture Perfect

It really isn't fair to call *Picture Perfect*, from Computer Support Corp., a "low-end" graphics package, even though its \$295 list price puts it among the less-expensive of the programs we reviewed. *Picture Perfect* does not have many of the sophisticated features that you'll find in the higher-priced programs, but what it does it does very well—and very easily.



Picture Perfect is an inexpensive program that, nevertheless, supports the HP PaintJet along with a variety of laser and dot matrix printers, as well as film recorders.

EASING RIGHT ALONG *Picture Perfect* cannot do 3-D graphs; it has no slide-show features and no symbol graphs. It can acquire some of these from Computer Support's *Arts & Letters*, a \$395 text-and-clip-art presentation package. (A driver that allows *Picture Perfect* to output a .PIC file for import into *Arts & Letters* was under development but not available for testing when this review was prepared.) Yet what *Picture Perfect* lacks in sophistication it more than makes up for in ease of use and quality of output.

Installation is simple without being simpleminded. You are prompted to insert and remove the nine disks involved, and you can choose directory names for the program's files. The only real flaw is that *Picture Perfect* is copy protected. Only one copy of the master program is provided, and only one installation on a hard disk is possible. The program can be uninstalled and reinstalled at will, but recovery from a disk disaster requires communication with Computer Support.

Picture Perfect is almost as easy to use as it is to install. It is actually a set of programs, one for each major type of graph it creates: vertical bar, pie, line/area, hori-

zontal bar, and bar/line graphs. After you select a graph type, a bar across the bottom of the screen identifies menu choices that can be made with command keys. Depending on the command entered, the rest of the space is devoted to filling functions, entry screens for text and data and their attributes, or the graph in progress.

Function menus are well organized.



FACT FILE



Picture Perfect,
Version 4.0
Computer Support Corp.
2245 Midway Rd.
Carrollton, TX 75006
(214) 661-8960
List Price: \$295
Requires: 512K RAM,

DOS 1.0 or later.

In Short: *Picture Perfect's* good high-resolution fonts and gray scales make for winning output on laser printers. On-line help is outstanding but the package includes no 3-D capabilities, no slide-show support, and no symbol library. Copy protected.

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■ DESKTOP SOLUTIONS

The main menu is never more than a couple of F8s away, and the program seems to work briskly for a couple of reasons.

One reason is that *Picture Perfect* does not replot your graph to the screen after every command is executed. Replots are under your control, and while the time saved may not be great, the amount of irritation avoided is tremendous. Waiting out a replot every time you change a pen color or save a file can get to be maddening.

The other reason is that the program is graced with truly outstanding on-line help.

Picture Perfect's help screens offer a dazzling variety of specific topics—its readily available hand-holding can short-circuit a great deal of user frustration.

Help screens are available for a dazzling variety of very specific topics, and striking the F7 key at any point gets you at least a couple of paragraphs of explanation. Such readily available hand-holding can short-circuit a great deal of user frustration.

CAPABLE, WITHIN LIMITS *Picture Perfect's* ease of use is a mixed blessing. The program doesn't do a lot of the more-difficult things some graphics packages will. On the output side there are no three-dimensional effects, no drop shadows for text, no way to merge symbols or clip-art graphics with charts.

Similarly, there are only limited ways to import data into *Picture Perfect*. It will read numbers from .DIF and ASCII files, if the files have been properly structured and you are able to tell *Picture Perfect* what that structure is—in terms of field starting points and lengths, for instance. The program will not import any other data files (note bene: it will not read 1-2-3 .WKS and .WK1 files), and it will not export its graphs in any widely used format.

It can direct output to files rather than to devices, so you can create a file of plotter commands in HPGL format that can be read by the *Ventura Publisher* and *Page-Maker* desktop publishing programs, according to Computer Support.

While the program may be short on sophisticated functions, it has the basics extremely well covered. *Picture Perfect* offers a stunning variety of fill patterns and gray scales. It comes with 13 type fonts, including 2 fonts that offer a very-high-resolution look, with none of the jaggies and awkwardness that mark the output of some presentation packages. Optionally available from Computer Support are an additional 32 type fonts—a cross-section of what is currently fashionable in typeset design, giving you a fair chance of matching a particular type font specified for corporate communications.

The gray tones and high-resolution type fonts give *Picture Perfect's* output the kind of quality appearance that desktop publishing programs and laser printers have made a standard. *Picture Perfect* is capable of the 300-dot-per-inch resolution of a laser printer. In fact, the program is capable of more than an unenhanced LaserJet can support: to print a full-page graph at the program's highest resolution requires extra memory in the printer.

Picture Perfect has muscle. It can get any output device to produce the best-quality image the device is capable of producing. With its relatively easy interface, its wide range of graph types, and its orientation toward clean execution of the basics, *Picture Perfect* helps nondesigners produce tasteful, informative graphics with a minimum of effort.—David DeJean

Pixie

Pixie, Zenographics' \$195 entry into the business graphics market, emerged this year as the hottest rookie in the league. Just 1 day after its March 20 release, *Pixie* edged out Ashton-Tate's new hope, *Draw Applause*, by a single vote to capture the title of crowd favorite in the National Computer Graphics Association's "shoot-out." It handily beat both Software Publishing Corp.'s *Harvard Graphics* and Lotus's *Freelance Plus* in the brief but rigorous performance tests.



FACT FILE



Pixie, Version 1.02
Zenographics
19752 MacArthur Blvd.,
#250
Irvine, CA 92715
(800) 423-3705
(714) 851-6352
List Price: \$195

Requires: 512K RAM, DOS 2.0 or later.

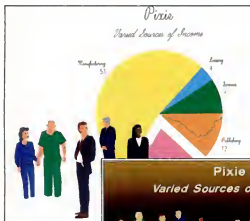
In Short: An easy-to-use program that performs well within its *Microsoft Windows* environment. Though limited in some areas, it sets new standards for graphics programs with its direct manipulation of chart elements and "smart objects" that automatically adjust to your graphing needs. Not copy protected.

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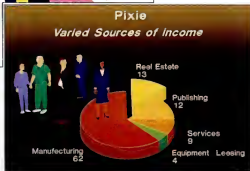
The ease with which you can get started in *Pixie*, its direct manipulation of graphics figures on-screen, its "smart" responses to your graphics wishes, and its friendly, familiar *Microsoft Windows* interface make *Pixie* a serious product for the business user who's not too serious about graphics.

For all you'll find in *Pixie*, there's a lot you won't find. However, in a product priced this aggressively, you may find the trade-offs are worthwhile. And if you want enhancements, they are as far away as Zenographics' \$1,195 computer-art product, *Mirage*. If your company already owns or plans to purchase *Mirage*, you can save your *Pixie* file in *Mirage's* .IMA format, pop it into the big sister's rich, creative environment, and embellish. If you don't own *Mirage* and don't want to pay its price, you can special-order symbols, clip art, and other enhancements from any of the many service bureaus around the country that use *Mirage* to provide artistic services to clients. But that, too, will cost you extra.

The growing importance of the *Windows* environment and *Pixie's* direct manipulation of on-screen graphics put the program at the front end of PC graphics technology. Through *Windows/286*, *Pixie* supports IBM's 8514 graphics monitor, giving you simultaneously up to 256 pure colors from a palette of 16 million, in resolutions as high as 1,024 by 768. *Windows*,



Pixie produces stellar slides, but paper copy may disappoint you. Pixie's fonts are not supported by the PaintJet driver in Microsoft Windows; it printed script where we specified Helvetica.



however, does put limits on Pixie.

There's no driver for high-resolution film recorders, for instance, although you can export your files in SCDL Matrix camera format or in .CGM (Computer Graphics Metafile). Here too, *Mirage* gives Pixie a gateway to greater capabilities by giving you access to 23 graphics cards, nine film recorders, 25 printers, and five plotters (if you export your files in the .IMA format). And the *Mirage* fonts in Pixie, though fine for slides, are not supported by Windows printer drivers.

As a standalone package, Pixie can be confining. Its 48-element symbol library pales next to the clip art of NCGA runner-up *Draw Applause*, whose art elements include eye-catching symbols along with colorful and dramatic backdrop landscapes. Pixie comes with only fine fonts, though you can customize the size, use italics or underline, and apply any of four densities of bold. If your graphing needs are text-heavy, you'll find a flexible word processor in Pixie, but without the spelling checker that you get in *Harvard Graphics*.

Regardless, for ease of use, a short learning curve, and the immediate gratification of watching your chart evolve before your eyes, Pixie is in a select league.

THE DIRECT APPROACH Javelin Software Corp. brought direct manipulation of graphics to the business world with its release of the *Javelin* spreadsheet. Business users could "what if" data to their hearts' content by manipulating the lines and bars in charts that they created in *Javelin*'s graphics module. Paint packages brought the concept to the computer graphics world. And Zenographics, with Pixie, introduced it to presentation graphics software.

Direct manipulation is Pixie's greatest strength. Unfortunately, it's also the source of the program's biggest irritation. You must wait for your screen to redraw after every move you make. Because Pixie automatically changes your data as you stretch bars and massage pie slices, direct manipulation also raises the danger of inadvertently introducing errors. The careful

executive will refrain from stretching graph elements to change data and, instead, will enter new numbers through the keyboard. Pixie gives you both options.

Pixie comes on two disks with an excellent 106-page manual. Installation is as easy as copying files from the disks to the Windows directory on your hard disk and then typing INSTALL. Pixie uncrunches its archived program files as it performs the installation, and within minutes you're ready to go.

CUTE AND FRIENDLY Though Billy Crystal needn't feel threatened by the manual's cutesy humor (for example, in a discussion of pie charts, "Click the Dupe icon. Piece of cake! Er, pie"), Pixie's documentation sets a friendly standard that others should follow—including Zenographics itself, whose documentation for *Mirage* was among the most confusing we encountered in these reviews. The first three chapters (36 pages) of Pixie's manual are devoted to logical, well-paced lessons that make you Pixie's master in less than an hour. The rest of the manual is a concise but complete and well-indexed detail summary of Pixie's features, options, and abilities. End users in a busy office can learn the program in a short time and look up more-arcane details as needed.

You start the program from your Windows screen. The program boots to Pixie's default word chart, framed by the familiar Windows interface. To create your own chart, you simply edit what you see on-screen, using

- the keyboard to clear Pixie's words and enter your own;
- the mouse to move, stretch, and pull the elements to where you want them; and
- the pull-down menus to access file information; edit the elements on-screen; change layout from landscape to portrait or slide; change chart types, colors, or style; and zoom in or out from various parts of your chart.

Pixie provides nine default charts, including word, bullet, table, bar, stacked bar, bar/line, line, area, and pie. An ingenious user can create scatter and bubble charts by bringing up the line chart, clicking on all the data points on the line, and turning off the Edge feature in the style box. But the procedure is not documented

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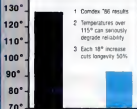


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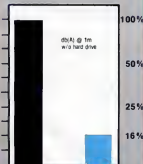
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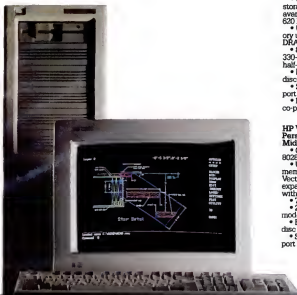
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- Separate mouse/graphics tablet port included
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Mid-level, 80286 based

- Choice of 8 or 12 MHz, Intel 80286-based microprocessors
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- Both 5.25 and 3.5 inch flexible disc drives supported internally
- Separate mouse/graphics tablet port included

HP Vectra CS Personal Computer

Entry-level, 8086 compatible

- 7.16 MHz, 8086-compatible microprocessor with zero wait states
- Up to 8 Mbytes of expanded memory, addressable via LIM 3.2 expanded memory specification
- 7 accessory slots for expansion
- 20 Mbyte hard disc model
- Both 5.25 and 3.5 inch flexible disc drives supported internally

HP Portable Vectra CS

Personal Computer

8086 compatible

- 7.16 MHz, 8086-compatible microprocessor with zero wait states
- Up to 6 Mbytes expanded memory, addressable by LIM 3.2
- Four I/O slots
- Supports two 3.5 inch flexible disc drives
- 20 Mbyte internal hard disc model available
- Up to 10 hour battery life
- IBM style keyboard

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HEWLETT
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■ DESKTOP SOLUTIONS

in the manual. Your own intuition must take over where *Pixie*'s cues leave off.

Nevertheless, *Pixie* is intelligent. If you change the first label on your axis from 1982 to 82, *Pixie* automatically changes the subsequent years' labels to 83, 84, 85, and so on. Change the first increment on your axis from 10 to 5 and *Pixie* automatically scales your chart to increments of 5. Nice. But *Pixie* can't always figure out what you want. If you change January to Jan, it changes February to Feb, but if you change January to Jan., you confuse it. It defaults to a numeric axis and changes February to 2.

With each chart you create, you begin

*Direct manipulation is
Pixie's greatest strength
as well as the program's
biggest irritation: you
must wait for your
screen to redraw after
every move you make.*

with one of *Pixie*'s nine chart templates. You can add elements to these by clicking on an object on-screen, using a dashboard tool called Dupe to duplicate it, and then moving the clone to the position you want. The value of your data appears in dialog boxes, and you watch it increase or decrease as you manipulate your chart elements.

DASHING INTO GRAPHICS Using the dashboard tools, you can also tell *Pixie* to Erase elements in your chart (eliminating them altogether) or simply to Hide them from view. Hide is an especially handy feature if you're developing a build series. You put all your data into your chart and, working backward, hide one element and then another until your build series is completed.

Hide is also useful when dealing with imported data. As with most other programs reviewed in this issue, *Pixie* rarely

displays imported data correctly unless you do a lot of editing in your spreadsheet. Even then, you will probably still have to use *Pixie*'s tools to massage your chart until it looks the way you want it. On import *Pixie* typically assigns your data a legend, which you may not want to display on-screen. Since erasing the legend also erases your data, Hide becomes necessary. (In addition to Lotus 1-2-3 files, *Pixie* can also import ASCII, .CGM, VideoShow, and *Mirage* files.)

Entering your data in *Pixie* is easy and even fun. Zenographics president, Bob Romney, describes it as "kind of like a video game," though we wouldn't go that far; thus you'll probably use the import feature rarely. You can change colors, fonts, and type sizes on several lines at a time by "marquee-ing" the elements (pressing the Shift key while clicking on the items you want), then indicating your choices on the dashboard.

With every choice you make—every change of data, color, font, or line style—*Pixie* redraws your chart. This lets you see the results of your selections immediately, but it quickly becomes annoying. A redraw occurs with virtually every click of the mouse, and if you're using anything slower than a 386 machine, the wait becomes time-consuming. Zenographics eliminated some redraw between Versions 1.0 and 1.02, and the company expects to reduce it further in future versions. The manual cautions you not to use clip art, 3-D effects, or Zenographics' proprietary fonts until you've made your chart look just the way you want it, because these effects take an especially long time to redraw. Believe it.

BANG FOR THE BUCK If you need specialty features like slide-show capabilities and live links to spreadsheets, and if you want the ability to add rich enhancements to your charts without having to purchase *Mirage* or turn to a service bureau's Zenographics library, *Pixie* isn't for you.

It is a product to watch. Dollar for dollar, there is a lot of value and innovation here. And as a graphics program that delivers simple but good-looking output with minimum fuss, it's as delightful as its name. You may love or hate direct manipulation, but even if you feel *Pixie* plays

fast and loose with data, you can still enjoy the game. *Pixie*, quite simply, is fun.

—Carol Ellison and Paula Seefeldt

SlideWrite Plus

Sometimes a rather modest, undistinguished exterior can conceal some truly noteworthy qualities. *SlideWrite Plus*, from Advanced Graphics Software, is a case in point. This package lacks the slickness of many other programs, but it has some features that set it apart as a strong contender in certain areas.

SlideWrite Plus is modest in its \$345 price, its packaging, even its size. All the files fit on two floppy disks, making it practical to run the program without a hard disk, though you probably wouldn't want to do that. Its function-key-driven menus aren't very elegant, but they're generally easy to follow and they get the job done.

The program can import only ASCII files that meet certain restrictions or Lotus 1-2-3 spreadsheet data. Before you can import spreadsheet data, you must use 1-2-3 to define the ranges of a named graph in your spreadsheet. This makes it simple to extract information for graphing from a large spreadsheet but somewhat reduces your flexibility in importing. Another restriction is the limit on the length of data labels, which forced us to abbreviate some of them in our test charts. On the positive

PC FACT FILE



SlideWrite Plus,
Version 2.1
Advanced Graphics
Software Inc.
333 W. Maude Ave.,
#105
Sunnyvale, CA 94086
(408) 749-8620

List Price: *SlideWrite Plus*, \$345; Fonts & Figures, \$99.

Requires: 512K RAM, DOS 2.0 or later.

In Short: This package is well-suited to meet the technical needs of scientists and engineers. Though such artistic features as the number of fonts and colors are limited, *SlideWrite Plus* offers many ways to manipulate and analyze data. Not copy protected.

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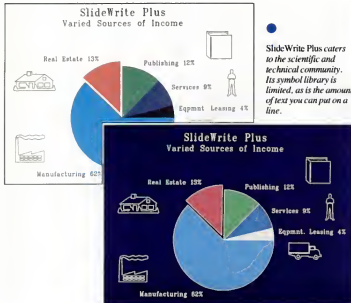


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■ DESKTOP SOLUTIONS



SlideWrite Plus caters to the scientific and technical community. Its symbol library is limited, as is the amount of text you can put on a line.

side, the program can handle up to 4,000 pieces of data.

SlideWrite Plus offers a wide assortment of options for displaying your data. You have at your disposal clustered, stacked, and overlapped bar charts in either vertical or horizontal orientation, as well as pie, line, scatter, area, high/low, and flow charts. There's also a text chart option that lets you edit different type sizes and styles in WYSIWYG mode.

FOR THE SCIENTIST The flexibility of data presentation doesn't stop at the chart types. In fact, many of the available options show that Advanced Graphics Software has cast an eye toward the highly technical needs of the scientific and engineering community. You can plot data against two independent y axes simultaneously. You can also display a second x axis using a different scale than the first, although you can't plot data against it. Axes can use either a linear or a logarithmic scale. You can even set the aspect ratio of the graph.

SlideWrite Plus can sort the segments of a pie graph so that they appear in order

of value from largest to smallest. It can also calculate and display each segment's value as a percentage of the whole.

If the data values you wish to graph aren't precise, you can use error bars for each data value on a bar, line, or scatter chart; these are extensions to the bars or points on a graph that depict the margin of error. In a line graph, you can add a jagged line that connects the data points or a straight line that shows the trend of the data without necessarily passing through any data points. You can also use a curved line and specify the polynomial order of the curve fit—that is, how much the line is allowed to curve to fit your data. Limiting the amount of curve can be useful in emphasizing a general shape or trend in a data set, rather than the precise values.

There's even a Statistics screen for each graph, which tells you such things as how well the curve of your line fits the data in your line graph and the total, mean, and standard deviation of the values in each data set. Another plus for the technical user is the program's ability to create multiple levels of subscripts and superscripts in textual annotations.

SOME LIMITATIONS Unfortunately, Advanced Graphics Software hasn't devoted this sort of close attention to the visual attractiveness of the *SlideWriter Plus* output. Perspective 3-D is available only for bar charts. The would-be artist has only eight colors and six fill patterns available. The two type fonts built into the program—a serif and a sans serif—are not very appealing. They are available in three different weights, italic or roman, filled or hollow, and you can size them however you want in the program's draw mode, but the trade-off for this flexibility is lettering that looks quite ragged on a printout. The problem can be somewhat ameliorated by installing Advanced Graphics Software's \$99 *Fonts & Figures* accessory package, which includes a more presentable serif and a few other fonts.

Another limitation is that you can't move labels and titles anywhere you want, although you can move legends. The program does have a very flexible draw mode that lets you add text annotations, lines, boxes, arrows, circles, and clip-art figures, then size them, rotate them, and move them to your heart's content.

A particularly nice touch is a pop-up on-screen directory of all the figures in the large clip-art library. You just enter the name that's below the figure you want,

Many of the available options show that Advanced Graphics Software has cast an eye toward the scientific and engineering community.

and that figure is added in the spot you have indicated on your chart. You can supplement the library with images from *Fonts & Figures*, which also includes a utility for creating your own figures.

SlideWrite Plus supports a wide range of plotters, as well as dot matrix and ink jet printers; it also accommodates the HP LaserJet. Although it can't produce matrix or

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■ DESKTOP SOLUTIONS

CGM output for film recorders, it does support the HP 7510, the ImageMaker, the Polaroid Palette Plus, and VideoShow. If you don't have your own film recorder, you can send output to the MediaNet service bureau in New York for quick production of slides.

SlideWrite Plus has a lot going for it. It may prove a real lifesaver to someone in a specialized scientific or technical field who finds that other graphics programs aren't up to the demands of highly complex data. On the other hand, anyone whose main concern is to wow the corporate boardroom with a feast of eye-popping visuals may find that this product just can't put enough icing on the cake.

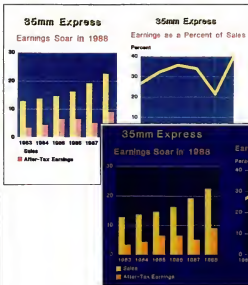
—Robert Kendall

35mm Express

As its name suggests, *35mm Express* began its life as a graphics package designed to create images for slides. And in the beginning, it did only that. In a continuing effort to make the program competitive with more-comprehensive packages, Business & Professional Software has released Version 4.1, with a variety of new features and support for additional output devices. *35mm*'s latest incarnation appears to bring the program to the level of the top ten players in many ways. However, the package's lack of import options and its poor plotter output leave this \$695 contender just short of grasping the brass ring.

35mm Express is a powerful program, but you'll find idiosyncracies within it. *35mm* supplies 32 fonts and supports over 40 output devices, and, perhaps because of that, the program includes 15 disks. The initial installation is straightforward, but it seems almost endless. During installation all fonts are loaded into the system, but they cannot be used until you go into the Defaults menu to install them for the device that will use them. The process requires you to install and remove fonts and devices until your system is customized and all the options you need are at your fingertips.

DEVOTION TO ART The icon-based interface is indicative of *35mm*'s extreme devotion to the art metaphor. The main menu presents you with five symbols and



titles: Create Edit, Output, File, Styles, and Defaults. Select Create Edit and you're confronted with a picture of a set of file tabs, as you would see them if you opened your file cabinet to search for a folder. What is your subdirectory called? A cabinet. What are your files called? Folders. While icon menus may make beginners more comfortable with the program, redefining the concept of files and directories only creates confusion for users who are accustomed to DOS.

For those seasoned users, the icons act as *Lotus 1-2-3*-style menus and can be elected by typing the first letter of an option rather than scrolling to it. Design menus are arranged as lists without accompanying icons and operate in the same first-letter fashion. And if the above methods don't suit your personality, corresponding keystroke commands are also available.

Creating polished text and bar, column, pie, line, area, tabular, or draw charts is a fast and simple process. Choose a chart type and the program customizes its uncomplicated data form. Fill in the data, type /D for Display Graphic, and your graph will pop up in such a stunning default style that you may be wary of modify-

ing it. Want to see how your data would look in a bar or line chart instead of a column chart? A few quick mouse clicks plug your data into all those chart types and more for your perusal.

35mm Express's extensive chart-editing options are among its greatest strengths. The program distinguishes between charts created in their original modes and charts converted to Draw

35mm Express was designed to produce slides but now supports a number of output devices, including the HP PaintJet, which produced the paper output shown with this slide.



FACT FILE



35mm Express, Version 4.1
Business & Professional Software Inc.
143 Binney St.
Cambridge, MA 02142
(800) 342-5277
(617) 491-3377

List Price: \$695

Requires: 256K RAM, DOS 2.0 or later.

In Short: Originally designed just to produce slides, *35mm Express* offers a large symbol library, draw capabilities, and excellent support of film recorders; it can now produce paper copy as well. Not copy protected.

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■ DESKTOP SOLUTIONS

mode. Any chart can be converted to a Draw chart, but not vice versa, so keep a copy of the original before making the conversion.

Convert charts to Draw to take advantage of 35mm's 100-symbol library, to create your own symbols, or to fine-tune your graph. You may find that the edits available outside of Draw mode are sufficient for most business graphs. Even without converting charts to Draw, you can add 3-D, change colors, and fiddle with borders and sizes. The advantage to keeping a chart out of Draw mode is that it remains

35mm Express has a few lessons to teach the top ten packages about film recorder output, with top-notch quality and a link to MAGIcorp.

tied to your data; once a chart is converted to Draw, data changes no longer effect changes in the graph.

35mm Express is an ideal package for users who want to design a graph style unique to their company. You can modify the specifications of one of the program's 13 predefined styles, or create your prototypical graph in Draw, complete with company logo, and save it for future use.

If data input is high on your list of priorities, you may have to look elsewhere. 35mm Express imports Lotus 1-2-3 and Symphony worksheet graphs only. Note that 35mm doesn't import .PIC files; instead, the program works with that area of the worksheet you've defined as a graph through 1-2-3's graphing functions.

LESSONS TO TEACH 35mm Express has a few lessons to teach the top ten packages about film recorder output. Not only is the quality top-notch, but the program's link to the MAGIcorp Network makes slide production a gloriously simple process. Set up an account with MAGIcorp, transmit your graphics via modem, specify

EDITOR'S CHOICE

- Graph Plus
- Harvard Graphics

Micrografix is a leader among the companies turning Microsoft Windows into a fertile applications environment, and Graph Plus showcases the fruits of its labors. The program is compatible with output devices supported by Windows, and it will soon offer its own Windows-compatible Matrix camera driver. But with or without Windows, Graph Plus is a superb design tool that deserves the attention of the professional artist. Its flexible work area, which lets you manipulate objects across twelve 8½- by 11-inch pages or group them in a single large area to be output to a D- or E-size plotter, is a powerful feature. The program affords absolute control over every graphics element on-screen, and its DDE (Dynamic Data Exchange) link will delight business users who need to continually update charts with on-line information.

Harvard Graphics, a previous Editor's Choice and winner of our Technical Excellence Award in 1987, continues on top as the same feature-filled, intelligent, but easy-to-use graphics program. Besides the array of chart types offered, the

program's ability to perform statistical calculations, its screen-show capability (complete with wipes, fades, and rain effects), and its spelling checker for text charts all combine to make Harvard a winner.

Others in this league show promise. Pixie's price and its direct manipulation of on-screen graphics are interesting, but Draw Applause is clearly the most impressive new graphics product on the market. Its elegant and customizable clip-art library, the variety of charts you can create, and its ability to rotate text put it clearly out front. Ashton-Tate, however, must address its limited font and device support, or else the potential we see in this first release won't be realized in the second. Also noteworthy is Microsoft Chart, an old program with an interface that sorely needs updating. However, few can match its analytical muscle. With a little work, Microsoft could return this onetime leader to the top of the charts. And the superb Autochart feature in Lotus Graphwriter II outweighs the otherwise middling capabilities of this Lotus product for users who repeatedly create the same chart using different data.

Rush, and your slides will be returned to you the next day.

As for hard-copy output, only plotters disappoint. With a six-pen plotter, for instance, the program tries to create orange by loosely hatching red lines over yellow lines. The resultant color is—well, loosely hatched red over loosely hatched yellow. Acceptable plotter output is certainly possible, but it necessitates printing out a color palette, playing around with pen combinations, and modifying colors on-screen to match the plotter's capabilities.

The manual suffers slightly from pro-

gram-expansion syndrome, mixing page numbers with letters and even words in an effort to accommodate recently added pages. Still, the manual is well written, and the Easy Start tutorials provide a concise introduction to the program's basic functions.

35mm Express doesn't have far to go to become competitive with the big sellers. Its \$695 price tag pinches hard, but with slides so polished and design features so extensive, 35mm Express may well be worth your graphics dollar.

—Stephanie K. Losee



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■ DESKTOP SOLUTIONS



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Text and tables	○	●	○	●	●	●	●	○	●
Horizontal bar	●	●	○	●	●	●	●	○	●
Stacked/overlapped/clustered	○ ○ ○	● ● ●	○ ○ ○	○ ○ ○	● ● ●	● ● ●	● ● ●	○ ○ ○	● ● ●
Vertical bar	●	●	○	●	●	●	●	○	●
Stacked/overlapped/clustered	○ ○ ○	● ● ●	○ ○ ○	○ ○ ○	● ● ●	● ● ●	● ● ●	○ ○ ○	● ● ●
Pie/exploded	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
3-D effect	○	○	●	○	○	○	○	○	○
Line/scatter	● ●	● ●	○ ○	○ ○	● ●	● ●	● ●	● ●	● ●
Area/high-low	○ ○	● ●	○ ○	○ ○	○ ○	● ●	● ●	○ ○	○ ○
Gantt/Port/bubble	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○
Maps	○	○	○	○	○	○	●	○	○
CHARTING CAPABILITIES									
Multiple charts/combination charts	● ●	● ●	● ●	○ ○	○ ○	● ●	● ●	● ●	● ●
Automatic legends	●	●	●	●	○	●	●	●	●
No. of line types/line symbols/fill patterns	6/0/0	15/10/5	8/4/0	25/5/6	9/0/216	6/12/6	8/8/4	8/11/38	4/6/6
Built-in drawing tools	●	○	●	○	○	●	●	○	○
Automatic conversion to black-and-white	○	○	○	○	○	○	○	○	○
Axis: auto-scaling/intelligent incrementing	● ●	● ●	● ●	● ●	○ ○	● ●	○ ○	○ ○	● ●
Grids	○	●	○	○	○	○	○	○	○
IMAGE FEATURES									
Size/rotate, flip, mirror/zoom	● ● ●	○ ○ ○	● ● ●	○ ○ ○	○ ○ ○	● ● ●	○ ○ ○	● ● ●	○ ○ ○
Bulids and overlays	○	○	○	○	○	○	○	○	○
Built-in symbol library/Can customize library	● ●	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	● ●	○ ○
Paint program capabilities	○	○	○	○	○	○	○	○	○
Layout: portrait/landscape/slide	○ ○ ○	● ● ●	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○
Color palette: built-in/user-defined	● ●	● ●	● ●	● ●	● ●	○ ○	○ ○	● ●	● ●
Graded tones	○	○	○	○	○	○	○	○	○
PROGRAM DESIGN									
Link to spreadsheet	○	○	○	○	○	○	○	○	○
Statistical grouping or summary operations	○	○	○	○	○	○	○	○	○
Supports math coprocessor	○	○	○	○	○	○	○	○	○
Macro, script, and/or programming language	○	○	○	○	○	○	○	○	○
Context-sensitive help	○	○	○	○	○	○	○	○	○
User-defined chartbook	○	○	○	○	○	○	○	○	○
Graphics style sheet	○	○	○	○	○	○	○	○	○
Accesses printer-based fonts	○	○	○	○	○	○	○	○	○
Can use downloadable fonts	○	○	○	○	○	○	○	○	○

PC — Indicates Editor's Choice ● — Yes ○ — No

Studio Software

[illegible]

(continues)

■ DESKTOP SOLUTIONS



Presentation Graphics Software: Summary of Features

(Products listed in ascending price order)

Desktop Software

PROGRAM DESIGN

Graphics export:

	Image Builder \$99	Nimbue \$195	Plaze \$195	Business Graphics II \$199	Picture Perfect \$295	SlideWrite Plus \$345	Char- Master \$375	Graph Plus \$395	Microsoft Chart \$395
.CGM (Computer Graphics Metafile)	●	○	●	○	○	○	●	○	○
.EPS (Encapsulated PostScript)	○	○	○	○	○	○	○	●	○
HPGL (Hewlett-Packard Graphics Language)	○	○	●	○	●	●	●	●	○
TIFF (Aldus)	○	○	○	○	○	●	○	○	○
.PCX (PC Paintbrush)	○	○	○	○	○	●	○	○	○

Graphics import: .CGM/.PIC

	●●	○●	●○	○○	○○	○○	○○	○●	○○
Data export: .WKS or .WK1/.DIF/ASCII	○○○	○●●	○○○	○○○	○○○	○○●	○○○	○○○	●●●
Data import: .WKS or .WK1/.DIF/ASCII	○○○	○●●	●○●	●●●	○●●	○●●	○●●	●●○	●●●

DEVICE SUPPORT

Video:									
Hercules	●	●	●	●	●	●	●	●	●
CGA/EGA/VGA	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●
8514	○	○	●	○	○	○	○	●	○
Mouse/tablets and digitizers/light pens	●○○	●●●	●○○	○○○	○○○	○○○	○○○	●●●	○○○
Plotters	●	●	●	●	●	●	●	●	●
Printers: laser/color thermal/ink jet	●●●	●●●	○○○	○○○	●●●	●●●	●●●	●●●	○○○
Service bureau link	●	○	○	○	○	○	○	○	○
VideoShow	○	○	●	○	○	●	●	●	●

MISCELLANEOUS

Slide-show facility	○	●	○	○	○	●	●	○	○
Batch mode for printing	○	○	○	○	○	●	●	○	○
Spelling checker	○	○	○	○	○	○	○	○	○

●—Indicates Editor's Choice ●—Yes ○—No

Desktop Software

Studio Software

Decision Graphics \$450	Draw Applease \$495	Freelance Plus \$495	GEM Graph Presentation Pack \$495	Harvard Graphics \$495	Lotus Graphwriter II \$495	The Gallery Collection \$695	35mm Express \$695	GraphStation \$795	Impres- sionist \$995	Kinetix Graphics System \$995	Nirxge \$1,195
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○	●	●	○	●	●	○	○	○	●	●	●
○	○	○	○	●	●	○	●	○	●	○	○
○	○	○	○	●	○	●	●	○	●	○	●
●	○	○	○	○	○	●	○	○	○	○	○
●	○	○	○	○	○	●	○	○	○	○	○

○○	●○	●●	○○	●○	○○	○●	○○	○○	○○	●●	●●
○○○	○○○	○○○	○○○	○○○	○○○	○○○	○○○	●○○	○○○	○○○	○○○
●●●	●●○	●○●	●●●	●○●	●●●	○●●	●○●	●○●	●●●	●●●	●●●

●	○	●	●	○	●	●	●	●	●	●	●
●●●	○●●	●●●	●●●	●●●	●●●	●●●	●●●	●●○	●●○	●●○	●●●
○	○	○	○	○	○	○	●	○	○	○	○
○○○	○○○	○○○	○○○	○○○	○○○	○○○	○○○	○○○	○○○	○○○	○○○

●	●	○	●	●	○	○	●	●	●	●	○
●	●	●	●	●	○	○	●	●	●	●	○
○	○	○	○	○	○	○	○	○	○	○	○

The Dell System 220. Once again the critics stole the words right out of our mouth.

"The Dell System 220 runs most PC Labs system benchmark tests at speeds that would make you think you're running a 386."

—PC MAGAZINE

"...the Dell machine is renewed evidence that the price of 286-based desktop equipment continues to drop rapidly, making such machines very attractive for daily work under MS-DOS even as they hold out the promise of running OS/2 in the future."

—WILL FASTIE, PC WEEK

"...includes a year's on-site support...in the price of the computer. This is the sweetest support deal offered by any computer vendor in the industry."

—ERIC KNORR, PC WORLD

"The hot item from a technical point of view is the System 220. This machine runs a 286 processor at 20 MHz, which is its major claim to fame."

—WILL FASTIE, PC WEEK

"...the System 220 has more going for it than just speed."

—PC WORLD



The reviews are beginning to pour in. And they read like a wish list for every power user looking to exceed the ordinary limitations of a 286 computer.

The computer everyone is praising in such glowing terms is the Dell System 220.

The first 286 computer with a clock speed of 20 MHz.

It's totally MS-DOS® and MS® OS/2 compatible. Yet it sells for much less than you may pay for a 386† computer.

Because you buy it direct from us. Eliminating the mark-ups and margins of computer stores.

We design and build every Dell computer right here in Austin, Texas.

We put each and every one through a comprehensive burn-in and a battery of diagnostic tests before we ship it.

And after we ship, we give you the best technical support you'll find anywhere in the computer industry.

Our technicians are on the phone from 7AM to 7PM every business day.

Almost any question you may have about a Dell system can be answered over the phone.

And, in the rare case, that your question can't be answered by an on-line technician, we'll send a Honeywell Bull technician by the next business day.

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Your Dell computer also comes with a thirty-day money back guarantee.

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This optional service contract is available in over 95% of the United States, with over 1,000 engineers in 198 service locations.

We also offer a One Year Limited Warranty,* which warrants each system we manufacture to be free of defects in materials and workmanship for one full year.

Feel free to call or write for the complete terms of our Honeywell Bull Service Contract, Guarantee and Warranty. Dell Computer Corporation, 9505 Arboretum Blvd., Austin, Texas 78759-7299

THE NEW 20 MHz 386+ SYSTEM 310.

The top of the line. It's our highest performance computer available, faster than the IBM® PS/2® Model 80 and the Compaq® 386/20. It runs at 20 MHz with the latest 32-bit architecture. Since it also has Intel's Advanced 82385 Cache Memory Controller, and high performance disk drives, the System 310 is ideal for intensive database management, complex spreadsheet development, CAD/CAM, desktop publishing or performance as a network file server.

Standard Features:

- Intel® 80386 microprocessor running at 20 MHz.
- 1 MB of RAM expandable to 16 MB without using an expansion slot.
- Advanced Intel 82385 Memory Controller with 32 KB of high speed static RAM.
- Socket for 20 MHz 80387 coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 8 expansion slots (6 available).

Options:

- 1 MB RAM upgrade kit.
- 20 MHz Intel 80387 and Weitek® math coprocessor.
- 2 MB or 8 MB memory expansion boards.

**Lease for as low as \$148/Month.*

System 310	With Monitor & Adapter	
Hard Disk Drives	VGA Mono	VGA Color Plus
40 MB - 28 ms	\$4,099	\$4,399
90 MB - 18 ms ESDI	\$4,899	\$5,199
150 MB - 18 ms ESDI	\$5,399	\$5,699
322 MB - 18 ms ESDI	\$7,399	\$7,699



THE NEW 20 MHz 286 SYSTEM 220.

As fast as most 386 computers, at less than half the price—more power for the money than any other system. An 80286 system that runs at 20 MHz, with less than one wait state. Completely compatible for both MS-DOS® and MS® OS/2 applications (it runs faster than IBM PS/2 Model 80), and with a remarkably small footprint, the System 220 is the ideal executive workstation.

Standard Features:

- 80286 microprocessor running at 20 MHz.
- 1 MB of RAM expandable to 16 MB (8 MB on system board).
- Page mode interleaved memory.
- Integrated diskette and VGA video controller on system board.
- One 3.5" 1.44 MB diskette drive.
- Integrated high performance hard disk interface on system board.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 1 MB 4.0 support for memory over 1 MB.
- Real-time clock.
- Three full-sized AT® compatible expansion slots.
- Socket for 80287 coprocessor.

Options:

- External 5.25" 1.2 MB diskette drive.
- 3.5" 1.44 MB diskette drive.
- Intel 80287 coprocessor.
- 1 MB RAM upgrade kit.

**Lease for as low as \$85/Month.*

System 220	With Monitor		
	VGA Mono	VGA Color	VGA Color Plus
One Diskette Drive	\$2,299	\$2,499	\$2,599
40 MB - 29 ms Hard Disk	\$2,999	\$3,199	\$3,299
100 MB - 29 ms Hard Disk	\$3,799	\$3,999	\$4,099



THE 12.5 MHz SYSTEM 200.

A great value in a full-featured AT compatible. An 80286 computer running at 12.5 MHz, this computer is completely MS-DOS and MS OS/2 compatible. The System 200 offers high speed drive options, industry standard compatible BIOS and on-site service. As Executive Computing said of this computer's predecessor, "If faster processing speed and low cost are two key issues affecting your purchase decision, this machine might be the ideal choice for your office."

Standard Features:

- Intel 80286 microprocessor running at 12.5 MHz.
- 640 KB of RAM expandable to 16 MB (4.6 MB on system board).
- 525" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200 watt power supply.
- Real-time clock.
- 6 expansion slots. (4 available with hard disk drive controller and video adapter installed).
- Socket for 8 MHz 80287 coprocessor.

Options:

- 512 KB RAM upgrade kit.
- 8 MHz Intel 80287 coprocessor.

**Lease for as low as \$99/Month.*

System 200	With Monitor & Adapter	
Hard Disk Drive	VGA Mono	VGA Color Plus
40 MB - 28 ms	\$2,699	\$2,999
90 MB - 18 ms ESDI	\$3,499	\$3,799
150 MB - 18 ms ESDI	\$3,999	\$4,299
322 MB - 18 ms ESDI	\$5,999	\$6,299



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LASER PRINTERS.

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15 pages per minute, text and full-page graphics. Dual 250 sheet input trays.

LASER SYSTEM 80; \$3,295.

8 pages per minute, text and full-page graphics.

LASER SYSTEM 60; \$2,195.

6 pages per minute, text and full-page graphics.

DOT MATRIX PRINTERS.

PRINTER SYSTEM 800; \$699.95.

Highest resolution text and graphics from a 24-wire dot matrix printer. Draft quality at 200 cps. Correspondence quality at 132 cps. Letter quality at 66 cps. Standard parallel and serial interfaces. Wide carriage.

PRINTER SYSTEM 600; \$499.95.

9-wire dot matrix. Draft quality at 240 cps. Near-letter quality at 60 cps. Standard parallel interface. Wide carriage.

PRINTER SYSTEM 300; \$199.95.

9-wire dot matrix. Draft quality at 144 cps. Near-letter quality at 36 cps. Four standard fonts. Paper parking. Standard parallel interface.

SOFTWARE. Operating System Software.

Dell Enhanced MS-DOS 3.3 with disk cache and other utilities; \$119.95. Dell Enhanced MS OS/2 Standard Edition 1.0 \$324.95.

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Studio Solutions

● If you agree that the 18 products you just read about are "desktop solutions" for business graphics, you'll soon see why we call the products in the next three reviews "studio solutions."

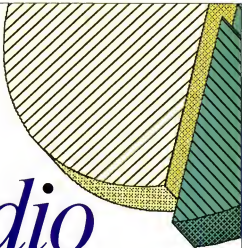
Impressionist, *Kinetic Graphics System*, and *Mirage* are not designed for the corporate bookshelf. Unless the shelf happens to be in the corporate art department, you are not likely to find these in the gray-flannel world of business. Their environment is one of living color. Look for them in art studios, ad agencies, and publishing houses. Their prices, which hover around \$1,000 per system, as well as their special capabilities, place them outside the reach of managers who need graphics software to chart spreadsheet data.

What manager, between meetings, would tolerate *Mirage's* steep learning curve or even want to access its powerful draw capabilities to create his own image library?

But what manager wouldn't be impressed to receive his graphics files back from the art department enhanced by a generous palette of colors and special effects achieved by a talented art staff equipped with *Mirage*? And what graphic artist would not be delighted to receive the array of creative tools these packages have to offer?

Mirage and *Impressionist* are for the professional artist, someone with enough sense of design, color, and computer power (not to mention patience) to use their

A world away from desktop graphics, these high-end programs arm studios, ad agencies, and publishing companies with dazzling graphics.



■ STUDIO SOLUTIONS

power well. They are included in this review because, like the 18 programs reviewed earlier, they are able to import outside data and output files to 4,000-line film recorders.

However, if studio solutions are what you need, you will not want to limit your investigation to these two packages. *Mirage* and *Impressionist* also compete with a variety of programs and graphics workstations that fall just outside the realm of our review. For that reason, we refrained from making an Editor's Choice in this particular category.

Among the 21 programs reviewed in this feature, none could beat *Mirage* on artistic excellence. But there are other op-

What graphic artist wouldn't be delighted with the array of creative tools these packages offer?

tions in *Mirage's* league. Targa applications, such as AT&T Graphics Software Labs' *Rio*, are expanding the upper reaches of graphics software's artistic boundaries. In a somewhat-pricier category are dedicated workstations such as those produced by Aztek and by Pansophic Systems, which range in price from \$20,000 to \$30,000. Pricy, indeed. But if you are prepared to pay \$1,000 for software alone, you may want to investigate systems that include hardware, software, storage, and peripherals.

Kinetic Graphics System is a package of a different stripe. Its many modules offer capabilities not found in other business graphics programs, though its comfortable interface and short learning curve make it much more accessible to the business user than *Impressionist* or *Mirage*. The value-added you receive from *Kinetic* is the versatility of its many modules. Combine its words, graphics, and layout modules, and it becomes as much a desktop publishing tool as it is a graphics program.

—Carol Ellison

Impressionist

It is always difficult when a software package has to make a compromise between ease of use for less-sophisticated users and flexibility for the expert players. *Impressionist*, Execucum Systems Corp.'s \$995 revision of Zenographics' *Mirage*, Version 5.0 (see review of *Mirage* 5.1), hasn't fully succeeded, but it has gone a long way toward achieving that balance.

Impressionist's main user interface is identical to what you will find in *Mirage*. The top of the screen is divided into a series of menus, accompanied by a description of the features in the graph you are working on. The command area, where you will find prompts for commands and data, is in the center, and a function-key help menu appears at the bottom.

Impressionist and *Mirage* are not exactly the same, however. The people at Execucum made several changes in the original format. For example, *Impressionist's* root menu is always displayed on the left part of the screen, and many of the menu choices have been given clearer descriptions than the relatively esoteric commands in *Mirage*. *Impressionist's* documentation is also a great improvement over that of *Mirage*. There are still some problems with organization (for example, the manual runs through a detailed description of the program before explaining how to get it up and running—not an extraordinarily logical presentation), yet it reads like the documentation for a single program, where *Mirage's* documentation comes in several manuals that do not seamlessly follow one another.

FOR THE ARTISTS AMONG US Like *Mirage*, *Impressionist* is meant more for professional graphics departments than for the executive who wants to turn out a good-looking pie chart. It imports data eccentrically: it pulls in everything, including titles and labels, and places them in separate groupings. You have to tell the programs which groupings to use. And it produces a variety of charts, then provides the means to spice them up through various options: line drawing, dimensions, color, pulled-in graphics, text, and more. It also includes such sophisticated features as a programming language, which expert



FACT FILE



Impressionist,
Version 2.0
Execucum Systems
Corp.
9442 Capital of Texas
Hwy. N
Austin, TX 78766
(512) 346-4980

List Price: \$995

Requires: 512K RAM, DOS 3.1 or later.

In Short: This powerful studio graphics package is more user-friendly than Zenographics' *Mirage*, which licensed its engine. Nevertheless, its language makes *Impressionist* more a candidate for corporate studios than end users. Not copy protected.

CIRCLE 66 ON READER SERVICE CARD

users can use to create routines for their less-sophisticated colleagues.

Since *Impressionist* tends to favor the highly computer-literate user, it employs a large number of specific commands that can take some time to get used to. Nevertheless, if you need something quick and simple, *Impressionist* includes a low-end module called Chartbook with which you can produce a simple chart by keying in your own data.

Most of the program's power lies in its two main modules: Basic Graphics, which you use to create and enhance your chart, and the Graphics Editor, in which you'll find *Impressionist's* more-sophisticated drawing and editing capabilities. The two interact closely; for example, in order to work with an image in the Graphics Editor, you first have to bring it up in Basic Graphics.

Impressionist gives you the choice of operating in either menu or command mode. The former is designed in a tree structure; each selection you make takes you to another branch. It is probably a good idea for beginners to stick with this menu system because *Impressionist* has a large number of commands, many of which interact in less-than-instinctive ways. Once you've got things down, however, entering commands in the command mode is much faster and more efficient. It also takes up less space on the screen, which can be important when you are

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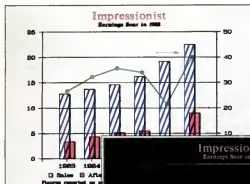
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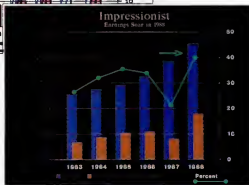
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■ STUDIO SOLUTIONS



Impressionist can create charts, but it shines on special features. These include a range of line types and fill patterns, as shown in the plotter output. Vivid colors make for attractive slides.



working on a chart in the Graphics Editor module; since all command lines and menus are superimposed on your graphic, a menu can obscure a considerable amount of the work on-screen.

A PROGRAMMER'S PROGRAM Once a basic graph has been created through either importing or keying in data, you can put your editing skills to work. You can change each element using the multitude of commands available. But while *Impressionist* provides the determined graphics artist with all the tools needed to come up with an impressive end product, it doesn't make the process easy.

Impressionist is definitely a "programmer's program." Many commands are couched in terms more conducive to their inclusion in a programming sequence than their use on a screen. That can be confusing to those who are unaccustomed to programmer's logic. For example, if you want to move a piece of text in Basic Graphics, instead of using the mouse or cursor to pick and place (which would make things a lot easier), you must specify

the new location on the screen using x,y coordinates. And to make things a bit more complicated, a factor of 0 indicates the program's default value. Thus, when you move a title to spot 0,0, you are not putting the title on the extreme bottom left of the screen; you are indicating that you want the program to place the title in a default position.

In fact, *Impressionist* is fairly bulging with rules that can trip you up if you're unfamiliar with the program. This becomes especially troublesome in the Graphics Editor, where I frequently found myself tripping over the elaborate command structure.

There, for example, you must go through a complex series of commands to specify which item or group of items you are working on before you execute any changes. When I wanted to overlay a line graph on a bar chart, I had to eliminate the background of the line graph by issuing the Select By command, specifying an Object that was the Background, and then Selecting All (meaning that I wanted to work on the background of the entire graphic).

Only at that point could I delete the background of the line chart, revealing the bar chart underneath. A simple Delete Background command would have made life a lot easier.

According to an Execucum representative, *Impressionist's* selling point is that it has a consistent user interface from micro to mini to mainframe, and users can port their graphics from one to another without having to learn a new program. The package is certainly possessed of an impressive number of features for creating sophisticated graphics, including an almost unlimited number of colors, a high degree of flexibility, and—what may be most important to corporations with MIS departments—a programming language that allows you to tailor the program to the specific needs of your company.

TOP-NOTCH TECH SUPPORT Execucum also has an excellent technical-help department. Although I had to wait for the technicians to call back, they were extremely patient and knowledgeable, and they thoughtfully dealt with the simple problems as well as the complex.

Companies with computerized art departments that need a highly sophisticated, programmable graphics system will definitely want to examine this package. But its concentration on programming skills makes the learning curve a bit too steep for the individual user.—Barbara Krasnoff

Kinetic Graphics System

Kinetic Presentations started as a graphics service bureau. It developed the *Kinetic Graphics System*, a software family of business graphics charting and design products, to serve its current client base as well as capture a new market. The design modules are called Graphics, Layout, Words, and Art. Each module, including the System disk, is sold separately for \$195 to \$395, but they can be purchased together at the somewhat discounted price of \$995.

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Harold

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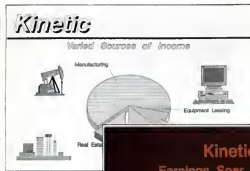
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STUDIO SOLUTIONS



Designed for desktop publishing and presentation graphics, Kinetic Graphics System produces great output on an HP LaserJet. These slides were produced by Kinetic's own service bureau.



seem unrealistic for most purposes, but it does provide file management facilities (transmission preparation and output) and is useful when communicating with Kinetic Presentations' own service centers, located throughout the country. For this review, we used all modules except Words to create various slide, laser printer, and plotter output.

OPERATING INSTINCTIVELY Program installation is relatively simple. After loading the program, we were encouraged to find that you can modify or update your device settings any time you choose.

The *Kinetic Graphics System* is so easy to use that the accustomed graphics user can forgo the system's five manuals and move instinctively to input or import data.

We imported *Lotus 1-2-3* data using the system's hierarchical menus. The menu structure is fairly intuitive. The main menu offers a path through each module. After you select Graphics, Data, Import, and then *Lotus* as the imported file type, an on-screen point-and-shoot indicator helps you find the filename. The same method is used throughout the *Kinetic Graphics System*. Unfortunately, no method is offered

to extract a data range, named or otherwise. And only .WKS extensions will be retrieved. *Kinetic* offers no means to import .WK1 files, so if you are using 1-2-3, Release 2.0 or 2.01, you have to translate your spreadsheet into a .WKS format before saving the file you will want to import.

The program asks you "Do you want the data imported as Rows or Columns?"—that is, inverted or noninverted from the layout of the spreadsheet. In *Kinetic*, x-axis labels will be retrieved only if they are located in the leftmost column. Also, titles and legends in the spreadsheet cannot be acknowledged automatically, so if you import them, expect to see them given zero values in the resulting graph in *Kinetic*. No matter how you like to set up your spreadsheets, you'll need to edit them to accommodate *Kinetic*'s proprietary format. *Kinetic* includes an easy-to-use on-screen data editor to assist you with the task.

Equipped with a data file in the correct format, you can go on to create your graph. *Kinetic* will ask, "Do you wish to use a template?" If you are using the *Kinetic* system for the first time, choosing an

existing template will provide little help. In any case, you must complete five pages of options before viewing your graph.

TEDIOUS TOGGLES Among these pages is one that requires you to toggle data sets on or off manually and assign a pattern to each. It's a bit time-consuming, and if you don't have all appropriate data sets turned on, you will not see an accurate graphic expression of your data. And you will find no easy shortcuts around this procedure. You can't fool the system by making templates with all data sets turned on; if you do, you may not see any display at all. Without this cumbersome procedure, the template would be much more valuable.

The other four pages contain mostly cosmetic enhancements: Titles, Fonts, Alignments, and many Color options. Valid color entries are numbers 1 through 255 or letters A through P. Two color palettes are provided but the colors are identified by letter, and even their descriptions in the manual do not provide the interpretation of the letters. Thus, if you do not own the Number Nine graphics card (recommended for this program, as it actually displays all 255 colors), you will not know the colors you have selected until you receive your slides. If you like surprises, you may find them here.

The templates can be time-savers when you're creating a series of graphs with like



FACT FILE



Kinetic Graphics System, Version 1.2G
Kinetic Presentations Inc.
Distillery Commons 250
Louisville, KY 40206
1990
(502) 583-1679

List Price: \$995 complete; Words, Layout, and System modules, \$195 each; Graphics module, \$295; Art module, \$395.

Requires: 256K RAM, DOS 2.0 or later.

In Short: There are enough tools here to satisfy everyone from the occasional graphics user to the professional presenter. The complete set of modules can serve the desktop publisher as easily as the graphic artist. Not copy protected.

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■ STUDIO SOLUTIONS

attributes (grids, footnotes, margins, and such) or a presentation where a theme is important. For instance, you may want all slides to have a black background, a yellow headline, and a blue ruling line of medium thickness. By using an existing template when creating each graph, you will have eliminated a number of repetitive steps. However, once a template from one data file is applied to another file, these files no longer have the ability to share their information directly. Changes in one are not reflected in the other. This was a bit disappointing because, if the files could be linked dynamically, users could employ the templates as style sheets. And style sheets, because they are shared files, typically do not ravage disk space as these templates do.

Other features in the system include a macro language, a full symbol library (which could be used more readily if accompanied by a printout with the filenames associated), and file output compatibility with the popular desktop publishing programs. *Kinetic's* Words module combines graphs with speakers' notes and produces professional audience handouts.

The *Kinetic* system is a much more pragmatic tool than the two high-end art programs, *Mirage* and *Impressionist*, reviewed with it here. But is *Kinetic* just a business graphics program? No. In fact, the system really is suited for someone whose needs extend beyond those of the professional number-cruncher. The indirect manner in which spreadsheet data is treated, combined with the absence of a live data link, may prove unnerving in a gray-flannel-suit environment where managers operate under tight deadlines, using numbers and statistics that require frequent updating.

FOR DESKTOP PRESENTATIONS

The *Kinetic Graphics System* does fit well into a category we refer to these days as *desktop presentation*. The program is project oriented, focuses on theme, offers an easy way to achieve conventional slide techniques like builds and dissolves, and even produces a few spectacular effects—all designed to add impact to a professional presentation. These people obviously know about slide production.

The *Kinetic Graphics System* is ideal for the corporate art department responsible for turning the data received from many departments into high-end presentations. The program is easy to learn and offers enough room for creativity to spark interest among the designer set.
—Tami Peterson

Mirage

Think of purchasing a machine on which to play video games, along with the game cartridges that go into it, and you can conceptualize Zenographics' high-end graphics product *Mirage*. *Mirage* is an environment for several graphics applications: Chart, Autumn, EGO, and DBM.

With Chart you create basic charts or graphs. You use EGO to edit them or add icons, draw symbols and other graphic elements, and combine images. DBM is Chart's built-in database manager, and Autumn is an abbreviated version of Chart, a sort of fast food cookbook of popular templates.

In Autumn (short for "Automatic *Mirage*"), the user selects a template and is prompted to produce the building blocks of the figure. The figure can be manipulated in EGO, and hard copy can be produced. The entire *Mirage* family sells for \$1,195, but the Autumn/EGO combination can be purchased separately if you want something more than Zenographics' low-end product, *Pixie*, but less complex than the full program.

The Chart/Autumn/EGO/DBM package is designed for heavy-duty production situations in a highly competitive market. The serious graphic artist will appreciate its capabilities. To the novice, it can be brutal.


Mirage has a long learning curve: Zenographics recommends 3 days of supervised training plus about 2 weeks of intensive exploration with the manuals (and there are five of them!). Even with that, the very efficient, friendly user hotline expects your phone calls. My contact at Zenographics pointed out that the Chart/Autumn/EGO/DBM package is advertised in magazines and journals for the graphics professional, not typically where an unwary dabbler might stumble across the snappy, high-resolution images and be lured into trying to produce them.

Artists in a professional graphics studio will appreciate the quality of this product's output, its command file functions, and the fact that it can be networked.

SPEAKING OF QUALITY *Mirage* is vector-based, or object-oriented. This means that objects are formed by connecting coordinates, something like the way children connect the dots in a busybook to draw a picture. The vector-based approach to image construction is fast and easy to edit and requires far less file space than raster, or bit-mapped, images. More important in terms of the high-resolution output that can make or break presentation graphics, an object-oriented image can be sharper and more detailed than a raster-based image.

Although most business presentation-graphics programs are object-oriented, few allow the kind of detailing possible in *Mirage*. Each polygon in *Mirage* can have up to 240 points, and the total number in an image is limited only by hardware capabilities. Now that's impressive.

Furthermore, there are several select functions in EGO that let you address minor details or an entire category of components. You can move, recolor, or rescale any object or its subset, or grab a point and distort the polygon unidirectionally. In addition to its ability to edit its generous library of text, icons, and backdrops, EGO is a rich object-oriented drawing package. This is a boon when designing or rendering

**FACT FILE**



Mirage, Version 5.1
Zenographics
19752 MacArthur Blvd.,
#250
Irvine, CA 92715
(800) 423-3705
(714) 851-6352
List Price: \$1,195

Requires: 512K RAM, DOS 2.0 or later.
In Short: A rich graphics environment with a programming language that can make difficult jobs simple. However, the steep learning curve is made more difficult by tortuous documentation. Not copy protected.

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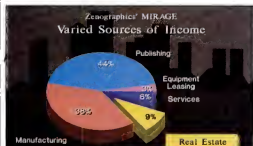


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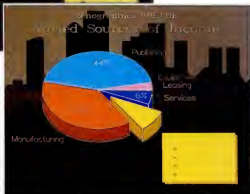


The Graphics Gallery demonstration copy runs on IBM PCs and XT's, vintage PCs, and most compatibles with an EGA or monochrome monitor with Hercules® graphics card. Lotus® 1-2-3® is a registered U.S. trademark of Lotus Development Corp. Hercules® is a trademark of Hercules Computers.

■ STUDIO SOLUTIONS



● *Mirage is used to enhance graphs created by other programs. Note its use of drop shadows, type styles, and the varieties of shading in the HP PaintJet and slide output here.*



logos, special icons, and the kind of custom-tailored images that separate your product from the common herd.

Zenographics can support up to 360 million colors, but for most purposes it uses a palette of 98 colors, a subset of the Genographics palette. You can easily select objects on the screen, compare the numerical notation for each color with those on the color chart accompanying the user manual, and adjust as necessary.

Device support is impressive. There are more than 75 drivers, and Zenographics claims that if you can't find yours on that list, you'll probably find one your devices can emulate. The Device Information Handbook accompanying *Mirage* clearly details the supported hardware devices and their configurations. The handbook also contains troubleshooting tips and techniques, and comes with a Test disk for testing whether or not your device will work with *Mirage*. *Mirage* outputs to film recorders capable of up to 4,096 horizontal by 2,732 vertical resolution.

THE NATIVE TONGUE *Mirage's* command-file functions make it a superior product for studio use. *Mirage* has its own language, Max, a batch language composed primarily of keywords associated with choices within the applications. The experienced user can bypass the complex menus by using keywords to import data and build or edit the image.

With Max, the user can build an automated set of tools that will be particularly handy with repetitive tasks. For example, if you have 30 slides that need the same change, you can set up command files to make the changes on all when you specify the change on one. Or, if you have a long list of illustrations that need to be printed overnight, you can set up a command file to ripple through the specific instructions; then you batch the printing process and go home.

Mirage can import and export a wide variety of file formats. Data can be downloaded from micros, minis, and mainframes into DBM for management, then

enhanced using Chart and EGO to produce slides, overhead transparencies, or print pieces. Graphics from ISSCO, SAS, and others can be downloaded for enhancement with EGO and then exported to an impressive list of hard-copy devices. *Pixie* files can also be imported into *Mirage* to take advantage of EGO. The ease of *Pixie* combined with the power of *Mirage* could be handy in situations where graphic satellites feed into a central resource.

Mirage, Version 5.1, has eight floppy disks to be installed, not counting those that contain additional fonts, the library of icons and backgrounds, and the output device tests. In a burst of user-friendliness, the "Start Here" pages supply a device worksheet that forces you to organize your thoughts about your devices and their connections before beginning installation. This is handy, considering that more than 75 devices are supported.

CHOOSE A VIEW *Mirage* lets you choose between a full-screen viewing mode, in which you toggle from image to menus, or a split-screen mode, in which the image and menus appear on separate halves of the screen.

The menus reflect the complexity of the program. Both Chart and EGO have main menus that can branch several times before you reach the desired function. The experienced user can avoid this by using either the function keys or the command functions. There are at least 29 programmed function keys. Add the options accessible through Max, and you can see why this is no package for beginners.

Zenographics would be well advised to turn over *Mirage's* five manuals for re-write to the person who produced the documentation for its little sister, *Pixie*. *Mirage's* many manuals are as difficult to follow as *Pixie's* are easy. For instance, in the middle of a tutorial on changing default colors, we found a discussion of lightness and saturation models—interesting, well-presented information, but when you're in the middle of learning how to change default colors you don't need to be side-tracked.

Mirage can import files from a variety of formats. But you may find it easier to enter your own data. I made a simple bar chart by substituting data in a tutorial. My

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■ STUDIO SOLUTIONS

bar chart came up in attractive default colors with type in two different sizes, the larger one for the title. The components appeared quickly on the screen, and the image filled the window. Chart offers a good deal of latitude for adjusting size, placement, labelings, and color, but the real fine-tuning is done in EGO. It takes a while to get the hang of what is done where, and how to work back and forth between the two menus.

SAVE AND SAVE AGAIN You can save an image two ways in Chart—as a specification (spec) file or as an image file. A spec file contains the chart data, the title,

Mirage's menus reflect the program's overall complexity—with at least 29 function keys and other options, it's no package for beginners.

font names, and so on in the format requested. An image file, on the other hand, is a display list of the actual graphic components, such as rectangles, arcs, and polygons that make up the image. To go into EGO, the spec file must be translated into an image file.

The icon library contains many symbols, which can be sized and edited. You can specify drop shadows and make your fonts vector-based so they will look better in high resolution. The ability to isolate choices and use them only when needed is a time-saver. Manipulating vector-based fonts is time-consuming so, if you wish, you can use bit-mapped fonts for size and placement, and switch to vector at the very last minute. *Mirage* also allows you to substitute a machine font and achieve really fast rewrite, with the size of the true font represented by a reference box.

Mirage is a sophisticated package packed with goodies, which are available only with a great deal of effort.

—Maureen Jones

28

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Designing GREAT GRAPHICS

Facing the Audience

● Gone are the days when you can dazzle an audience with a Lotus 1-2-3 pie chart: they'll smirk at its elliptic shape, squiggly lines, and hard-to-read fonts. Chart-making programs now outnumber spreadsheet software, and businesspeople are increasingly taking advantage of them. This year, of the estimated 30 million business presentations made daily, a third will include visuals, and about half of those will be composed on a computer. And those percentages are going up.

Studies by the Wharton School of Business and 3M Corp. show that good business graphics do indeed help to explain concepts and persuade audiences. But many users of presentation graphics software, lacking graphics arts training, fall prey to software claims that guarantee you

can create perfect charts every time.

The result? Cluttered charts and poor presentations from business users who are all too eager to use their software's many features. In fact, sloppy visuals (yes, even those prepared with computer graphics) present a negative speaker image, lose the audience's attention, and detract from the message.

How do you prepare a good presentation?

START WITH A SCRIPT You should think of your presentation as a performance, with you as the lead actor. Your talk is your script; your visuals are your props.

To script your performance, define your goals and those of your audience.

Presentations are performances in which you have center stage. A good script and thoughtfully composed slides will make your show a success.

■ ELEMENTS OF DESIGN

Consider the demographics of the group you're addressing. Outline your subject; jot ideas, don't write your presentation word for word. By the time you have expanded an outline, designed visuals, and rehearsed your talk, you'll know your topic well enough to speak eloquently from notes, using your slides as your cue.

Keep your presentation simple without being simplistic. State your purpose and position, make your argument with three or four main points, then offer a conclusion and a course of action.

While outlining your script, think of graphics possibilities for your slides. You'll need to consider slides for transitions, summaries, and conclusions, as well as for your main points, to keep the presentation cohesive.

When creating your graphics, keep in mind that, wherever possible, a chart should show a trend to which the audience must react. Avoid excessive details. Audiences can't absorb them in the short time a chart is on-screen.

Whether you use 35mm slides or overhead transparencies, the same principles of good design apply. A good slide focuses on one idea at a time. It contains the essence of the idea.

TEXT SLIDES DOMINATE Text slides (titles and bullet, column, and paragraph charts) make up about 75 percent of all visuals used, and the rules for creating them apply to all other types of slides as well.

■ Make it easy to read. Using large, legible typefaces. For easy reading, standard typefaces—like Modern, Helvetica, Aristocrat, or Times Roman—are preferred to a script, or to any font that is embellished with curves and squiggles. Drop-shadows will help letters stand out from the backgrounds.

■ Use only one or two typefaces. But feel free to use italics or boldface and employ up to three sizes of the same type in your presentation. Whether you're using all caps or a combination of caps and lowercase, you should remain consistent when depicting similar elements in your slides—perhaps all caps for every title, with initial caps and lowercase for all body text.

■ To emphasize a thought, use another

DEVELOPING THE IDEA

- Examples illustrating a projection of the idea in operation (flow charts, anecdotes, specific results, pro forma material).
- Reiteration of the main idea in the same words or in different words to help summarize, to drive the idea home, and to ensure that the listeners will remember the point.
- Statistics, if used sparingly and presented as simply as possible.
- Comparisons with similar or dissimilar types of operations, ideas, and so forth.
- Testimony of experts, witnesses to events, users of the product or procedure—such evidence should not be overused; the expert's reputation must be justified, and the credibility of the witness or user should be firmly established.

Slide produced by M&G Corp.

DEVELOPING THE IDEA

- EXAMPLES
- REITERATION
- STATISTICS
- COMPARISONS
- TESTIMONY

Slide Produced by M&G Corp.

color or underline, boldface, or italicize text. To avoid distraction, do not use more than two styles at a time.

■ Use a smaller typesize and a darker color for footnotes and annotations.

■ And if you're repeating a company logo over several slides, place it in the same position (keeping it the same size) on every slide.

INTROS AND CONCLUSIONS The introductory title slide sets the tone for your entire presentation. Your title slide should use short, punchy lines with "you" appeal: "How You Can Make More Money in Real Estate" rather than the impersonal "How to Make More Money in Real Estate." Enhancements like graduated backgrounds, images, symbols, and logos also help.

Similarly, your concluding slide should use a slightly different design with somewhat different wording: "Yes, You Can Make More Money in Real Estate with the Right Attitudes and Tools."

BULLET CHARTS Bullet charts can show key ideas while you speak about each point. For variety, substitute check marks, boxes, arrows, or triangles for bullets, but keep your choice consistent from slide to slide. Instead of centering the lines, try justified-left lines and use pertinent images at the right. Place subtle, shadowy images behind text lines. Other rules of thumb include:

- One thought per line.
- Six words per line for maximum readability.
- Six lines per slide maximum.
- A different color for the bullet than for text.
- Four colors maximum; no more than two enhancements.
- The brightest, lightest color for the most important text.
- If your text is a paragraph—a quote, adage, philosophy, summary, or some action to follow—avoid crowding by filling no more than three-quarters of the slide with text.

This slide presents text that is small and hard to read. The presenter should discuss the meaning of each topic and not attempt to give all the details in the slide.

A good text chart is succinct and easy to read. The title is bolder than the text. White, the brightest and lightest color, is a good choice for topics, while yellow, less bright, is used for the title and bullets.

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Eggs	245	Vegetables	290
Dairy Products	306	Sugar	138

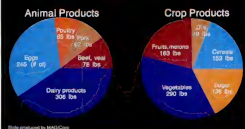
*Number of eggs

Slide produced by MAG/Comp

Information on a tabular chart may be well organized, but it takes time to read. A viewer will often gloss over tabular data, and the data will not communicate the impression you want to leave.

Annual Consumption

(per person)



If you abandon the tabular chart and illustrate the data in a pie chart, the viewer can visually comprehend trends and relationships from the size of the pie slices.

BUILD SLIDE SERIES What is a build slide series? When you have more information than you can put on one visual, divide the information among two or more visuals and "build" up your points or arguments one at a time in a series.

In the first slide present a title and the first topic using a bright color type. In the second slide present the next topic on a new line in the bright color; fade the first line to a darker color. In each subsequent slide introduce a new topic in the bright color, with previous lines deemphasized. The final slide will summarize all the points.

COLUMN CHARTS A column or tabular chart can show relationships among categories of ideas. It can be text or a combination of text and numbers, but to avoid obscuring your data in these, avoid segmenting the information into checkerboard squares or too many lines or columns. If

you're using table charts in a build slide series, the first slide might show the first set of data, with each subsequent slide showing another line or column until the chart is filled in.

Column charts should include no more than three words per entry. When including numbers, emphasize important data or totals by changing the color of those figures.

BWARE OF MISREPRESENTATION

At a glance, a well-done chart illustrates trends, movement, and comparisons that would require longer study if presented as numerical data. Avoid crowding a chart with unnecessary figures, legends, text, or other descriptive material; these dilute your message and confuse your audience. And keep in mind that there are many ways that misinformation can creep into charts. A change in the scale on a horizontal or vertical axis, for instance, can cause a

curve to be exaggerated. Different grid divisions in parts of a chart can cause one portion to appear gradual and another as a fast drop or rise, even though their rates are the same.

Design elements can visually alter the effect of data, in fact, even when it's correctly presented. Red and black bars or lines, for example, will appear more important than those in yellow or light blue. Solid bars appear weightier and more important than outlined bars when both are in one chart. Hatch marks and textured patterns can also cause visual distortions; a bar filled with vertical lines will appear taller beside a bar with interior horizontal lines.

DATA CHART CHECKLIST There are several points to consider when planning charts for a business presentation. Here are the most important among them:

1. *The right chart for the data.* Which chart to use for what? Fortunately, the computer lets you experiment. If you don't like the way your data is presented in one chart type, you can quickly test it in another format. Keep in mind, though, that certain types are recommended for certain types of data. A single-bar chart, for example, places a value within a set time period. A double-bar chart compares two variables with one another in a set time period.

A line chart emphasizes data movement with definite angles of change and implies a carryover from one time period to the next. A pie chart, or a 100 percent bar chart, divides parts of a whole.

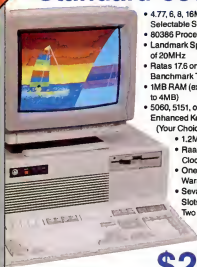
2. *Simplicity.* Overall, limit the number of elements you use in a chart. Twelve bars or bar clusters (for each month of a year) are the maximum in a bar chart. In noncalendar charts, six bars or fewer are easiest to interpret. For the greatest comprehension of your chart's intended points, bars should be arranged so that they graduate from the smallest to the largest, or vice versa, whenever possible.

There are also guidelines for individual chart types. A line chart should have no more than four lines, and fewer if the lines intersect. A pie chart ideally should have no more than six slices; the largest slice should begin at the 12 o'clock position, with slices arranged from largest to smallest in a clockwise direction. Area and sur-

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PC Magazine, Feb. 15, 1988

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Career Starter Kit Options

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■ ELEMENTS OF DESIGN

face charts should have the largest or smoothest segment at the bottom, with descending order of sizes piled above.

3. *Shade, color, texture, emphasis.* As with text charts, don't use more than four colors, plus black and white, in any one data chart. And in any one presentation, data and text charts should have the same color scheme. Text, titles, and backgrounds should be consistent.

Yellow, white, orange, green, and light blue elements are good against black and dark blue backgrounds. Or use a reverse color scheme like dark blue, black, dark green, or burgundy on a gray or light blue background. Dark backgrounds, you'll find, always work better in a room with ambient lighting. But avoid a dark background slide followed by one with a light background; it causes viewers' eyes to squint as they readjust to different lighting.

Light-colored bars, lines, pie slices, titles, and tag lines will appear more prominent than those in darker colors. Choose colors for each of these element groups carefully, however, when they're user-selectable. Software or slide-making services that lack the flexibility to let you select or change characteristics for these elements are candidates for rejection. There are too many automatically generated slides in which data lines, frame lines, and x-y axis labels are all the same. Or the frame is always white regardless of other colors shown; consequently the frame pops out of the chart first, rather than does what's enclosed.

Use lighter and brighter colors to emphasize specific elements. If all bars are blue, a yellow bar might suggest projected sales. Emphasize a specific pie slice by coloring it differently or exploding it from other pie slices. In a multiple-line chart, one line (say, for projected sales) could be heavier, brighter, or lighter than other lines for emphasis.

Different textures for elements must be carefully placed next to one another, especially in black-and-white output. Hatch, solid, vertical, and horizontal lines output by a dot matrix printer can be confusing next to each other; many laser printer drivers, in fact, interpret them as different shades of gray.

When using textures on adjacent bars in a bar chart, place a solid dark bar between



These images, used in place of bars in a chart, don't communicate. The chart is not well centered, and the arrow points to nothing specific. The distorted symbols—each in a different color—only distract.



A centered chart—using a title that states the subject, along with accurately sized and stacked symbols of a single color—communicates much more effectively. The arrow with the text shows that 1988 was "the best year ever."

others. Avoid putting plaids next to horizontal and vertical lines. Remember that vertical lines appear to lengthen a column; horizontal lines make it appear shorter.

Colors have psychological associations, too. Black suggests profit and gain, and green represents steadiness, growth, money. Avoid red in business slides, especially for totals; it suggests fear, anger, stop, error, debt. Blues are cool, calm, serene, and trust-inspiring, which is one reason bankers wear blue suits.

4. *Order of line thickness and color.* Chart structure lines should vary in weight, thickness, and color, with the heaviest and brightest lines used for data. Frame lines should be next in weight and a

less obvious color than the data lines; grid lines should have the lightest weight but the darkest color. Avoid, for example, using a white frame, white grid lines, and a data line that are all the same weight.

Grid lines should be eliminated if the chart reads well without them, and they should especially be avoided if they run through bars in a bar chart or surfaces in a surface chart. Don't use both horizontal and vertical grid lines: this gives a chart a game-board appearance.

Tick marks, the tiny scale lines that often appear on the y axis of a chart frame, can be eliminated unless they're essential for reading the chart. If you move numerical tags from the y axis to the top of a bar,

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■ ELEMENTS OF DESIGN

for instance, the tick marks may remain to help viewers visualize size and numerical comparisons among bars of data.

5. *Labels, legends, and tags.* X- and y-axis labels generally make the frame color and typeface selected for the title, but in a smaller size. But a program that preselects a white frame will also yield white labels, both of which will pop out ahead of everything else. One slide service, in fact, not only has a default of a white square frame for data, but it adds an oval white frame around the slide as well. The result is unattractive; the data line is less visible than the structure lines.

A y-axis label such as "Millions of dollars" or "% of market" should be at the top of the y-axis line so that it reads horizontally. Too many programs place a default tag vertically along the y axis, which forces you and your audience to twist your necks to read it.

For pie, line, and surface charts, you should place numbers and figures on or close to the element. On a pie chart, match the label color to the associated slice for a visually pleasing slide. Legends, another potential problem, may be eliminated by placing tags on or next to data objects—bars, pie slices, and lines. When used, legend labels should read in the same order as the objects.

6. *Showing how things work or move.* A diagram chart shows structure or conceptualizes an idea. It may be an organization or flowchart, a PERT or Gantt chart, or a drawing of how a system works. Maps, too, are charts.

Generally, labels of parts on a diagram should read from top to bottom or left to right. The same criteria and design rules apply to diagrams as to other charts: They should be easy to read, uncluttered, and accurate. Colors should organize areas and like elements. Titles and subtitles should be short. Complex diagrams can be broken into a series where one part of the diagram is added in each slide. Or you can emphasize a different part in each slide, as it is discussed. This provides a reason to change slides and avoids keeping one slide on-screen for too long.

7. *Enhancements.* While there are different schools of thought regarding the use of images to enhance graphics, the fact remains that people have become more pic-

torially oriented than ever. A picture is a vehicle for communicating a message to an audience more dynamically, but there are problems in using images indiscriminately. A 1986 study by 3M and the University of Minnesota, titled "Persuasion and the Role of Visual Presentation Support," showed that presentations were 43 percent more effective when visuals were used. But it also noted that illustrations sometimes got in the way of comprehension.

You don't need a lot of imagination to begin using images—carefully and cautiously. Software manuals or computer graphics books and magazines provide ample examples for good ideas, and these pointers will help, too:

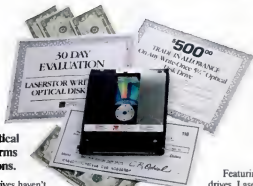
- Exercise restraint in all design elements.
- Select images that relate to the topic.
- Use images to add punch or emphasis.
- Keep image sizes and colors subordinate to the message.
- Use three-dimensional enhancements carefully.
- Don't use all of a program's fancy features in one slide.

THE PRESENTER AS ACTOR With the props in place, it's time for you to step into your role. Have a title slide on-screen as your audience enters the room. Pace the use of slides throughout a presentation; don't keep any one slide on-screen too long. (A good average is about 45 seconds per slide.)

When you show a new slide, stop talking for as long as it takes you to read the slide silently. When you discuss the slide, use different words. People remember 70 percent of what they see and hear; less if they only see, read, or hear it. After you've made your major points, summarize and conclude on an enthusiastic note. Punch home the final statement and put a slide on-screen that makes action easy.

When you've prepared your script well, set up your props, and presented your topic dynamically, you'll discover that knowing what to do and having professional visuals will give you the confidence to stand before any audience without fear. Even if this is your first presentation, when you perform like a pro your audience will perceive you as one.

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You've Got All The Answers. REMOTE² offers a selection of answering modes for about any need you can think of. In "Restart" mode, the R2HOST will take a call and respond to it automatically, then re-boot and wait for the next call. In "Manual" mode, R2HOST accepts a call at the host operator's request, then keeps both host and call keyboards live, for co-computing, training, or troubleshooting. In "Always Ready" mode, REMOTE² allows you to call in and monitor the progress of an ongoing program, make changes in it, then continue it after you hang up.

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Vertical Scan	<small>Greenest Range</small> 45-120 Hz	50-80 Hz	50-70 Hz
Resolution	<small>High Resolution</small> 1024 x 768	960 x 720	1024 x 768
Price	<small>Best Value</small> \$1,375	\$1,395	\$1,550

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Designing GREAT GRAPHICS

Adopting A Graphics Family



● Could this be you? You have a PC at your fingertips, but what you really need is an on-hand graphics department.

You border on graphics illiteracy but must nevertheless compete with graphics pros.

You have limited resources to dole out for fancy output devices, but you need brilliantly colored presentations.

Fortunately, professional-quality graphics are not out of reach for PC users who need more than what the best PC graphics packages ordinarily offer. For a number of vendors, software is just the entrance to a variety of goods and services that can deliver the total graphics solution.

Here are six software packages that open the door to the resources available to

you from some of the major computer graphics houses.

The products—*Autographix Auto-Visual*, *Graftime*, *PCchart*, *Personal Business Slideware*, *Presenter PC*, and *Slideworks*—offer a range of products including not only PC-based graphics software but also high-end graphics workstations, film-imaging equipment, and custom art services through their networks of established service bureaus. These companies boast graphics expertise and the ability to meet a full spectrum of needs. To paraphrase an old baby-food slogan, "Graphics is their business—their only business."

We reviewed only the PC products offered by these companies. However, the

Even the best PC software sometimes needs a hand when it comes to delivering professional-quality graphics. These entry-level packages key into the resources of major graphics houses.

■ GRAPHICS FAMILIES

PC software should not be regarded as standalone entities; each package is but one member of a family. The bare-bones PC, in fact, is best characterized as the family's poor relation, offering a foot in the door to the rest of the family line. And when it's coupled with the skills of the other family members, the result is a synergistic one.

ONLY BEGINS WITH PC Each of these programs lets you create a graphic and send it via modem to a centralized imaging center. At the center, you can either spruce up the image at a high-resolution workstation or output it directly to an expensive imaging device. Because these packages have dedicated communications modules and built-in job/work orders, unlike independent service bureaus (see article, "Slide Fare for the Common Man"), many of the problems that would often be encountered in transmitting images for out-of-house processing can be eliminated along the way.

Bear in mind that while the rich relatives on the workstation branch of the family tree are raking in the dough, the lowly PC package may be an afterthought in these organizations—not the focus of a vendor's attention. In other words, PC packages available from these total systems vendors are rarely state-of-the-art when considered on their own. Some incorporate weird copy protection schemes. Others offer low-resolution, non-WYSIWYG displays. There tends to be poor support for local output devices, and 3-D images were available in only one package. More serious, these packages have built-in rules that can cramp your graphics style.

Because these packages are created by artists for nonartists, they also impart a comforting feeling that you can't go wrong. Through intelligent defaults and limited options, the packages actually protect you from yourself. Colors, fonts, and typesizes, for instance, are carefully controlled. High-quality charts, text slides, and tables are emphasized, permitting a limited number of variations on the theme. Free-form graphics are also limited. Because you're guided each step of the way and you're linked to sophisticated graphics equipment, your work looks great.

Autographix AutoVisual

Autographix AutoVisual, a new release from Autographix that is a revamped version of the *Autographix 35 Presentation Graphics* software, is available as a front end to the five regional Autographix imaging centers. The program reflects a modernization of its long-standing predecessor. The fill-in-the-blank chart forms of the old program are replaced with pop-up windows. The user interface incorporates responsive dialog boxes.

The next step past your PC is one of Autographix's imaging centers, which produce output to 35mm slides, overheads, and color hard copy on a variety of devices including Celco (4K) film recorders and a number of third-party laser and color thermal printers. *Autographix AutoVisual* is upwardly compatible with the company's 286- and 386-based Designer Series Workstations. These workstations incorporate the Autographix proprietary graphics system and display controllers and are intended for commercial slide producers to large corporate sites.

Autographix's service bureaus provide imaging services for their PC users, but they operate as what the industry calls a "click shop." That is, they "press the button" to image your work but don't provide custom art enhancements on their Designer workstations. What you can do is contact a number of third-party slide producers to obtain special effects like graduated color backgrounds or corporate logos.

A recent development at Autographix Imaging Centers has been sort of an open-door policy. Besides accepting their own Autographix software images, the centers now accept files from *Harvard Graphics*, *Lotus Graphwriter*, *Freelance Plus*, and *Lotus 1-2-3*.

ENSURING GOOD DESIGN The *AutoVisual* buzzword is *guidelines*: they run rampant throughout the program to ensure the production of good graphics design for non-graphics-oriented people. First, there are guideline templates for five categories of graphs: pie, bar, line, word, and tabular. Each template incorporates guidelines for palettes, text font and size, and color.

You can have as many as 256 colors in an image, and three predefined palettes offer an automatic selection of complementary colors. If you select a Word Chart guideline, for example, the default BUI color palette attached to it gives your image a blue background, yellow titles, light blue text, and green bullets.

A custom option for free-form drawing is included as well. This option accesses a menu of built-in primitive shapes like rectangles, lines, and circles; you can enter, size, rotate, and copy the shapes on-screen. Finally, there are at least 60 lovely, full-color clip-art symbols. Many of the symbols are incorporated into attractive borders, which help you create a well-designed layout.

You create a graph or chart through the *Autographix 35* tradition of completing a series of forms describing the image. To create a line chart, you enter legend, label, and data information into specified workspace areas. A number of special edit options let you manipulate such items as background color, borders, and grid line colors. You can size a chart and easily create multiple charts on a page. You can also create a build sequence and 3-D charts. A handsome utility converts full-color images to black and white, which is helpful for those users who want both their laser-printer and color-slide output created from



FACT FILE

AUTOGRAPHIX

Autographix AutoVisual
Autographix Inc.
P.O. Box 9031
Waltham, MA 02154-9031
(617) 890-8558
List Price: \$695

Requires: 640K RAM; 20MB hard disk; IBM PC, XT, AT, PS/2, or compatible; CGA, EGA, or VGA display; DOS 3.0 or later for AT; DOS 2.0 or later for XT.

In Short: This new PC product offers interactive menus and friendly dialog boxes to guide you through the creation of word and data charts. Built-in color palettes and formalized guidelines allow for some impressive results. Not copy protected.

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■ GRAPHICS FAMILIES

the same graphics information.

While many of the features of the Designer workstations, such as a raster conversion utility, are displayed in the PC program's menus, they're not available if you're operating in a standalone PC environment.

Once you create an image, you preview it, full-screen, on your display. *Autographix AutoVisual* offers seven core fonts available in 15 different sizes, and the guidelines offer a preselected choice of the best font size for each chart type. Thanks to Autographix's strategic relationship with Compugraphic, a leader in high-quality typesetting fonts, the fonts used are true Compugraphic fonts that can be automatically kerned.

AutoVisual's built-in communications module is extremely well designed. You specify how many images you want, what type of output you want, and even how you want to be billed. Next, you fill out a menu of phone information, press a function key, and you're connected to an Autographix Imaging Center.

The centers offer slides for \$10 with a standard 24-hour turnaround; other rates are available for rush orders. The service centers rely on Autographix's dedicated production management software. Local printing devices supported include Epson dot matrix printers, a number of plotters, the HP LaserJet, and others including the Mitsubishi color thermal printers.

Graftime

Genigraphics is one of the world's largest providers of professional graphics-service bureaus and a leader of VAX-based graphics workstations. Besides offering a full line of proprietary imaging equipment and high-end workstations, it has 26 regional graphics service bureaus. These bureaus offer traditional graphics services (you can walk in with a concept for your artwork on a piece of paper and walk out with a computer-generated 35mm slide) as well as computer-based services like imaging your PC graphic to any Genigraphics film recorder. Recently, Genigraphics bureaus have also begun to support third-party software files like *Harvard Graphics* and other Computer Graphics Metafile (CGM)-producing graphics packages. The company

also makes its driver available to other manufacturers that wish to make their products "Geni-compatible."

Graftime is the PC foot in the door to Genigraphics' capabilities and is upwardly compatible with the full line of Genigraphics workstations and film recorders.

Designed for nonartists, Graftime is the PC foot in the door to Genigraphics' services.

Carefully designed for nonartists, this nine-disk program implements restrictions at every turn, but these tend to be prudent. The well-designed program is easy to use and produces some very nice results.

VARIETY OF CHARTS *Graftime* creates 14 types of common charts including line, pie, bar, title, word, and organizational. You can create a global style sheet specifying a particular palette of colors, font, borders, and drop-shadow effects for all images in a given presentation.

Geni's art staff handpicked *Graftime's* five predefined palettes and four font types for the way they project onto screens. Select a color scheme such as blue, green, violet, or black, and a palette of complementary colors is automatically implemented. Even the drop-shadow color is preselected for you.

After selecting a chart type from the main menu, you receive an on-screen form with various input fields. Every field is limited to a maximum number of characters, title fields are automatically centered, and there are other similar restrictions to ensure "graphically correct" results.

The fill-in-the-form chart creations are comprehensive and include checklists where you specify border and drop-shadow effects. You can even use the chart forms to create a "build," in which a series of slides show a sequence of aligned, color-coordinated images. Or you can create a "highlight" that spotlights one element in the graph for emphasis.

If you follow the defaults, the results

will be impressive. But should the program's capabilities leave you wanting, you can call a Genigraphics service bureau and ask them to add some pizzazz. A staff of artists can create logos, paint a fancy background, or create other effects on the high-end, VAX-based Geni consoles that will be combined with your images.

Graftime's built-in parameters can make for rigid graphs. Legends always appear below graphs, and only a few types of multiple charts are permitted. There is no symbol library, no exploded pie slice, no sizing of a chart, and no 3-D graphics capabilities. *Graftime* has an integrated spreadsheet for data input, but you can't import data from other sources. Those foolishly enough to forgo print preview don't even need a graphics card to use this program, but with a graphics display you can get a full on-screen preview as well as a number of "quick" print preview options.

The built-in communications module creates a graphics metafile that can be transmitted to other high-end Geni workstations, to a film recorder, or to Geni's VAX-based data collector, which is on-site at its graphics service bureaus. Slides cost approximately \$10 each, and overnight turnaround is standard.

In the past few years Genigraphics—once committed to its proprietary architecture—has been opening up channels to third-party devices as well. *Graftime* sup-



FACT FILE

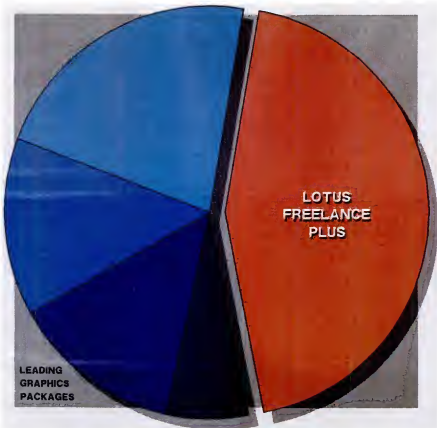


Graftime, Version 1.1
Genigraphics Corp.
4806 W. Taft Rd.
Liverpool, NY 13088
(315) 451-6600
List Price: \$395
Requires: 384K RAM;
hard disk recommended;

IBM PC, XT, AT, or compatible; graphics card (for local previewing); DOS 2.0 or later.
In Short: A low-cost PC business graphics package that sports 14 types of common business charts. Using the built-in communications module, it can transmit the image to any of 26 regional Genigraphics service bureaus. Not copy protected.

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■ GRAPHICS FAMILIES

ports a number of local output devices, including many plotters and dot matrix, laser, thermal, and ink jet printers. It also supports output to the Matrix, Polaroid Palette, Calcomp, and Samurai film recorders, and MAGIcorp service bureaus, as well as to Geni's own Masterpiece series of film recorders.

PCchart

Among Aztek's full line of graphics software, hardware, and services are a number of 286- and 386-based turnkey systems; examples are StudioSystem and Artcenter. These workstations can be configured with a number of Aztek software products that perform paint, chart, and production management functions. And Aztek offers several proprietary output options, including its FilmStation image recorders and Print-Station printers.

PCchart is Aztek's entry-level program. It offers simple and attractive chart output although, on its own, it suffers from poor support of local devices. You can create a graphic with *PCchart* and send it, via modem, to any of the six Aztek Artcenters and Slidegraphic Service Centers around the country. The independently owned and operated Artcenters are outfitted with Aztek's high-end equipment, which can produce 4,000-line-resolution slides, black-and-white prints, overhead transparencies,

and color thermal output. Aztek also offers a free-form draw program for the PC called *PCartist*, which can be used to enhance *PCchart* images.

Unfortunately, *PCchart* suffers from a dual-floppy mentality. To load the program in your PC, you're told to put DOS in drive A: and run a batch install program that makes the disks bootable. Each time you boot the program, you'll need to swap disks in drive A: a few times; this is a terrible deterrent to hard disk users. The install program rewrites your CONFIG.SYS file and insists you use the identical version of DOS that Aztek did when the company created the program. But all is not lost if you don't: Aztek configured a disk especially to simplify installation for our use and says it will do the same for all Aztek customers.

Once installed, *PCchart* uses its 32-row by 32-column spreadsheet for all data entry, and it can import data from .DIF formats. A series of fill-in-the-blank forms is used for creating charts, and each of the 57 available chart templates includes individualized built-in defaults to ensure good graphic design. Charts include standard bar, line, pie, area, word, and organizational types, as well as Gantt and tabular charts.

PALETTE WHAT YOU WILL The program's strength is its overwhelming palette of 14,000 colors: you can opt to define colors using Pantone Color specifications, English-language names (red, green, and so forth), a hue/saturation/lightness model, or Aztek's own numerical scheme. The array is staggering, but to make color selection easier, Aztek includes three predefined color palettes (of 11 colors each), plus the ability to create and save your own customized palette.

PCchart has no built-in symbols, chart size, 3-D effects, drop-shadows, or build sequences to enhance the graphic further. Those capabilities are available in *PC-artist*.

To prepare images for transmission, you must first create a run file containing a list of visuals and then use the included ARTNET utility to transmit the file. The communications module built into this utility transmits a complete job containing as many as 99 visuals to any Aztek Art-

center. Each center has its own pricing and turnaround policy, but generally you can receive a slide for about \$6 to \$8 dollars in 24 hours. A "comment area" in the job submission form lets you specify special processing instructions.

In addition to its line of FilmStation image recorders, Aztek supports Matrix, Polaroid Palette, Geniographics, and Lasergraphics imaging equipment. You won't be able to get much more than a "proof" to a hard-copy device, however, before transmitting the image. The only way to get a local printout is to press Shift-PrtSc.

Personal Business Slideware

Not to be confused with the Canadian firm of the same name, the Minneapolis-based Management Graphics Inc. offers two PC products that tie you into a network of more than 40 worldwide, independently owned and operated Management Graphics Service Centers.

Personal Business Slideware is the company's PC package, which has been optimized for creating simple bar, line, pie, and text slides. Although it offers limited capabilities for local output devices, it boasts four built-in fonts, a symbol library, and free-form drawing capabilities; and, with Management Graphics' supplied col-



FACT FILE



PCchart
Aztek Inc.
17 Thomas
Irvine, CA 92718
(714) 770-8406
List Price: \$495
Requires: 448K RAM,
hard disk recommended;

8087 math coprocessor; IBM PC, XT, AT, or compatible; color/graphics card (CGA, EGA, or VGA); DOS 2.0 or later.

In Short: Supplies predesigned formats for building attractive word slides and graphs, using an available 14,000 colors (16 per image). Created images can be transmitted to any Aztek Artcenter for enhancement and output. Copy protected.

CIRCLE 479 ON READER SERVICE CARD



FACT FILE



Personal Business Slideware
Management Graphics Inc.
1401 E. 79th St.
Minneapolis, MN 55420
(612) 854-1220
List Price: \$249

Requires: 512K RAM, hard disk recommended; IBM PC, XT, AT, or compatible; DOS 2.0 or later.

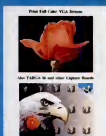
In Short: Optimized for creating simple word and data charts, this program has limited but well-implemented features, plus a communications component for transmitting work to an MGI image center for processing. Not copy protected.

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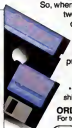
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- Q & A 3.0 (database, word processor) ... 209.
- Inbox (E-mail) ... 349.
- Breakthrough Timeline 3.0 ... 349.

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- XTRÉE Pro 1.0 ... 69.

TOPS ... NCP

- Flashcard (AppleTalk network card; 1 year warranty) ... 169.
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- TOPS 2.0 ... 119.

Traveling Software ... NCP

- Battery Watch (3 1/2" only) ... 27.
- LAP-LINK Plus 1.0 ... 85.
- Desklink 2.0 ... 99.

True BASIC, Inc. ... NCP

- True BASIC 2.03 (now includes Runtime) ... 57.
- Precalculus (now includes Trigonometry) ... 32.
- Algebra (includes both I & II) ... 32.

Vericom ... NCP

- SoftBytes 2.0 ... 35.
- SoftBytes 386 2.53 ... 49.

WordPerfect Corp. ... NCP

- WordPerfect Library 2.0 ... 69.
- WordPerfect Executive 1.0 ... 129.
- WordPerfect 5.0 ... 255.
- DataPerfect 2.0 ... 299.

Xerox ... NCP

- Ventura Publisher 1.1 ... 549.

RECREATIONAL

Accolade ... CP (reqs. graphics brd.)

- Hardball (baseball simulation) ... 11.
- Testdrive (driving simulation) ... 24.

Electronic Arts ... CP (reqs. graphics brd.)

- Chuck Yeager's Flight Simulator ... 32.

Infocom ... NCP

- Zork Trilogy ... 33.

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- Gunship (requires CGA or EGA) ... 32.

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Microsoft ... CP

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Mindscape ... CP

- Balance of Power (reqs. graphics brd.) ... 30.

- Deja Vu (reqs. graphics brd.) ... 30.

Parlor Software ... CP

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- King's Quest III (requires CGA or EGA) ... 33.

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Sphere, Inc. ... NCP

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Sublogic ... NCP

- Jet 2.1 (requires EGA or CGA) ... 33.

XOR ... NCP

- NFL Challenge ... 69.

HARDWARE

Manufacturer's standard limited warranty period for items shown is listed after each company name. Some products in their line may have different warranty periods.

AST Research ... 2 years

- IQ Mini 2 C/S/P ... 89.

1-800/243-8088



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Advantage 2-386 (for PS/2 Model 80) ... call

RAMpage 2-286 (for PS/2 Models 50/60) ... call

RAMpage 286 Plus MC

(for PS/2 Models 50/60) ... call

Amdek ... 1 year

410A (amber monochrome monitor) ... 159.

LaserDrive-1 (CD-ROM Drive; 90-day wty.) ... 629.

Computable ... 2 years

2-Position switch box ... 29.

3-Position switch box ... 39.

Cuesta ... 1 year

Datasaver 400 Watt (standby power unit) ... 459.

Curtis ... lifetime

ACCESSORIES

Disk Holder DB-1 (holds 50 5 1/4" disks) ... 8.

Printer Stand PS-1 ... 18.

Universal System Stand SS-3 ... 25.

DS-1 Switch Box (controls 2 printers) ... 33.

CABLES

Smartmodem to PC Cable (9 feet) ... 17.

Printer to IBM cable (9 feet) ... 17.

SURGE SUPPRESSORS

Safesrip SP-3 (6 outlets; 1 year wty.) ... 21.

Diamond SP-1 (6 outlets) ... 32.

Ruby (6 outlets; EMV/RFI filtered; 6 ft cord) ... 59.

Ruby-Plus (w/FAX & modem protection) ... 69.

DCA ... 1 year

Irma 2 (3270 emulation board) ... 729.

Epson ... 1 year

We are an authorized Epson Service Center.

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LQ-1050 printer (136 col., 264 cps, 24 pin) ... call

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Everest ... 1 year

1200 Baud Internal Modem ... 79.

2400 Baud Internal Modem ... 149.

5th Generation ... 6 months

Logical Connection 256k ... 449.

Logical Connection 512k ... 529.

Hayes ... 2 years

Smartmodem 1200 ... 299.

Smartmodem 1200B (with Smartcom II) ... 299.

Smartmodem 1200B (no software) ... 265.

Smartmodem 2400 ... 449.

Smartmodem 2400B (with Smartcom II) ... 449.

Hercules ... 2 years

Graphics Card Plus ... 189.

Network Card Plus (with TOPS DOS) ... 349.

Intel ... 5 years

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Aboveboard 2 0k (for Micro Channel)	279.
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8087-2 (for PS/2 Models 25 & 30)	149.
80287 (for AT & XT286)	165.
80287-6 (for 6 MHz 80286 machines)	239.
80287-10 (for PS/2 Models 50 & 60)	279.
80387 (for 16 MHz PS/2 Model 80)	469.
80387-20 (for 20 MHz PS/2 Model 80)	679.
80387-25 (for 25 MHz PS/2 Model 70)	879.
Kensington Microware ... 1 year	
Masterpiece	94.
Masterpiece Plus	109.
keytronic ... 3 years	
101 Keyboard (enhanced layout)	99.
Kraft ... 1 year	
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KYE International ... 1 year	
Dyna Mouse GM-6 Plus (w/Dx Halo II)	59.
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Series 2 Mouse (for PS/2 50/60/70/80)	65.
HiRez Mouse (bus only)	89.
Mouse w/Point Show (bus or serial)	95.
Mouse w/LogiCAD	119.
Microsoft ... lifetime	
SPECIFY BUS OR SERIAL VERSION	
Mouse with Paintbrush	109.
Mouse with EasyCAD	125.
Mouse with Windows and Paintbrush	145.
Migent ... 1 year	
Pocket Modem (1200 baud, incl. software)	119.
MSC Technologies ... lifetime	
SPECIFY BUS OR SERIAL VERSION	
OmniMouse w/Designer Pop-up menus	57.
(1 year warranty)	89.
PC Mouse w/PC Paint +	89.
PC Mouse w/AutoSketch	105.
NEC ... 2 years	
Multisync II (800 x 560 max. resolution)	call
NSI Logic ... 3 years	
Epac 480 (extended EGA)	149.
Smart EGA Plus (supports 800x600 res.)	179.
Smart VGA	229.
Orchid Technologies ... 2 years	
Try! Turbo 286	269.
Designer VGA	349.
Ramquest 2	549.
PC Cooling Systems ... 1 year	
REPLACEMENT POWER SUPPLIES	
Turbo Cool 150 (run 25° - 40° cooler)	129.
Turbo Cool 200 (run 30° - 45° cooler)	169.
Silencer 200 (69% noise reduction)	149.
Personal Computer Support Group... 1 year	
Breakthrough 286 Accelerator Board (8 MHz)	299.
Breakthrough 286 Accelerator Board (12 MHz)	449.
Personal Peripherals ... 5 years	
Microbuffer Inkline (pas. print buffer w/32k)	135.
P/Link (parallel line extender w/32k)	99.

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1200 Baud External Modem	109.
2400 Baud Internal Modem (w/ProComm)	159.
2400 Baud External Modem	189.
Princeton Graphics ... 1 year	
Ultrasync (supports CGA, EGA, VGA)	549.
Toshiba ... 1 year	
P321SL printer (80 cps, 216 cps, w/raster)	529.
P351SX printer (136 column, 216 cps)	999.
T1000 Laptop (80C88, 6.4 lbs., 5 hr. battery)	call
T1200 Laptop (80C86, 10 MHz, 20 Meg)	call
T3200 Laptop (80286, 12 MHz, 40 Meg)	call
T5100 (80386, 16 MHz, 40 Meg)	call
768k Ram Card for T1000	299.
Video 7 ... 2 years	
VEGA Deluxe (supports 640x480)	219.
VEGA VGA (supports full VGA specs)	287.

DRIVES

IONEGA ... 1 year	
Bernoulli II Single 20 Meg Internal (5 1/4")	779.
Bernoulli II Dual 20 Meg External (5 1/4")	1679.
20 Meg cartridge (5 1/4")	59.
Bernoulli Box 40 Meg (8")	1679.
20 Meg cartridge (8")	82.
PC2 Card	169.
PC2B Card (bootable card for PCXT/AT)	229.
PC4 Card (for PS/2 Model 50/60/80)	299.
Mountain Computer ... 1 year	
40 Meg Internal Tape Drive (XT, AT or PS/2)	379.
40 Meg External Tape Drive (XT, AT or PS/2)	479.
60 Meg External Tape Drive w/Power Supply (AT or PS/2)	1199.
Plus Development ... 1 year	
Hardcard 20 Meg (49 ms)	549.
Hardcard 40 Meg (39 ms)	699.
Seagate ... 1 year	
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30 Meg Internal Hard Drive ST238 (w/controller and cables, 65 ms)	329.
40 Meg Internal Hard Drive for AT (40 ms)	439.
40 Meg Internal Hard Drive for XT (w/controller and cables, 40 ms)	499.
TEAC ... 1 year	
PC, XT 360k Drive (5 1/4" half-height)	99.
720k Drive (3 1/2" half-height, specify XT or AT)	99.
Toshiba ... 1 year	
AT 360k Drive (5 1/4" half-height)	99.

DISKS

All disks have a lifetime warranty.	
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Fuji MD2D (10 disks per box)	\$12.
Sony (10 disks per box)	12.
Maxell MD2-D (10 disks per box)	13.
Verbatim Datalife (10 disks per box)	13.
5 1/4" DS/High Density Disks for AT (1.2 Meg)	
Fuj MD2HD (10 disks per box)	22.
Sony (10 disks per box)	23.
Maxell MD2-DD (10 disks per box)	23.
Verbatim Datalife (10 disks per box)	22.
3 1/2" DS/DD Diskettes (720k)	
Sony (10 disks per box)	18.
Fuji (10 disks per box)	19.
Maxell (10 disks per box)	20.
3 1/2" DS/High-Density Diskettes (1.44 Meg)	
Fuji (10 disks per box)	55.
Maxell (10 disks per box)	59.

MISCELLANEOUS

CompuServe	
CompuServe Information Service	24.
Grolier's OnLine Encyclopedia	32.
Cables ... lifetime	
Smartmodem-to-AT cable (9 feet)	15.
Parallel Printer cable (5 feet)	19.
PC Connection Computer Toolkit	22.

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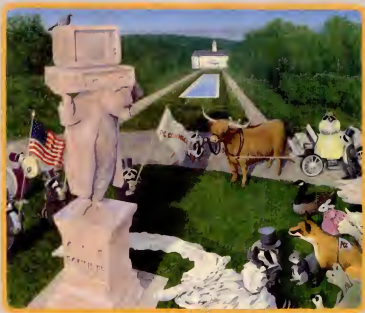
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■ GRAPHICS FAMILIES

or chart, you can create slides with 64 colors. A simple, built-in telecommunication component allows you to fill out an interactive job order form and dial into the service centers.

Although each service center determines its own pricing, \$9.95 is standard for a normal 24-hour processing turnaround. MGI's proprietary *Quickchart* software receives *Personal Business Slideware* images and outputs them at 2,000-, 4,000-, or 8,000-line resolution to MGI's own Solitaire film recorder. Most of the service centers are also equipped with one of MGI's TTS series graphics

workstations. These workstations enhance and customize *Personal Business Slideware* images.

The PC package's communications component lets you fill out an order form and dial into an MGI center.

workstations. These workstations enhance and customize *Personal Business Slideware* images.

The top-of-the-line workstation is the \$100,000 Trimaster. The company also sells its own version of *35mm Express* (reviewed in this issue) with a direct driver into its bureaus.

To augment its product line and expand the number of software programs it can image, Management Graphics expects to have released the \$99.95 *MGI Talk* by the date of this issue's publication. *MGI Talk* is a communications utility that allows any SCODL-driving software package to link with MGI's service centers (SCODL is the Matrix film recorder's file format); the utility includes a built-in job order form.

Any package that can create a SCODL image can have output created on either the Matrix or the MGI Solitaire film recorder. The list of supported packages includes *Harvard Graphics*, *Freelance Plus*, and *Microsoft Chart*.

MGI also has a \$149 product called *Easy Slider*, which converts any Macintosh PICT files into film output, using a built-in communications utility to commu-

Presenter PC

nicate with MGI centers. After using the Mac's graphics program to create your image, you can size and position it and assign color using *Easy Slider*.

Crosfield Electronics, a large maker of prepress equipment, and Dicomed Corp. merged less than a year ago to form Crosfield Dicomed. Spokespersons say that the merger will result in broader-based, more-powerful graphics technologies.

Of all the packages reviewed here, Crosfield Dicomed's *Presenter PC* most closely resembles a full-fledged drawing program. Instead of using the graphics display screen primarily for print previewing, however, *Presenter PC* lets you manipulate the elements directly on the screen.

You can drag and place text and graphics elements anywhere on the screen. Absent are the fill-in-the-blank forms that are the backbone of graphics creation in the other packages; this makes *Presenter PC* extremely flexible and more capable than the other programs at creating customized graphics. Also, the program has a built-in spreadsheet for entering data and can accept it from any .DIF format. Along with the 24 built-in chart types (with such rarities as standard deviation, error deviation, high/low charts, and overlapped bars), you can use graphics primitives like lines, squares, and rectangles to create custom graphic images.

EXTENSIVE IMAGE CONTROL

Presenter PC offers extensive control over the image. You can assign foreground and background elements, tilt and rotate text, create drop shadows, manipulate and size individual text characters, adjust chart size, and even adjust the width and overlap of bars and columns. You can create a succession of images (a build) or specify a highlighted color to focus attention on an item in a given slide.

The program has precise tools for controlling text alignment and justification as well; you can enhance the charts with borders, tick marks, pie explosions, and bullets, to name a few. Unfortunately, *Presenter PC* lacks a symbol library and cannot create 3-D graphics.

A single palette of 64 colors offers a

comfortable but not overwhelming selection. Unlike some others reviewed here, the package contains no predefined palettes. *Presenter PC* comes standard with two popular built-in fonts; an optional 22 fonts are available as well.

While it is flexible, *Presenter PC* is not especially easy to use. The screen is divided into quadrants, identified by coordinate numbers. And since 0,0 are the center coordinates, you frequently work with negative coordinates. Too often I mistakenly wound up with mirrored or inverted text because I entered the wrong coordinates.

Instead of using a small cross-hair cursor, *Presenter PC* uses a full-screen cursor that I found confusing because I often mistook it for part of my design. The best advice I can offer is to use the program with a digitizer tablet or mouse.

Using *Presenter PC* is also easier if you're geometrically inclined. To draw a line, you identify the vertex; to draw a wedge, you must identify starting and ending angles. Text can be drawn and aligned with extreme precision, since you can control the positioning of descender lines and baselines.

Presenter PC can output hard copy images to a number of Epson and HP printers, including the LaserJet. Optional support for SCODL and VideoShow drivers is



FACT FILE



Presenter PC,
Version 3.0
Crosfield Dicomed Inc.
11401 Rupp Dr.
P.O. Box 246
Minneapolis, MN
(612) 895-3000
List Price: \$995 (may differ among bureaus).

Requires: 512K RAM; hard disk recommended; IBM PC, XT, AT, or compatible; color/graphics adapter; MS-DOS 2.0 or later (3.0 required for international use).

In Short: A powerful tool for creating word and data charts as well as freehand drawings. The program relies heavily on an interactive interface and lets you directly manipulate graphics elements on-screen, then transmit the image to a Crosfield Dicomed Center. Not copy protected.

CIRCLE 679 ON READER SERVICE CARD

AT + PS/2



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When you find yourself stuck in a "technology gap" look to Mitac for creative, reliable, fully supported solutions. Call toll-free for the name of your nearest dealer and details about Mitac's new third-party service and authorized service centers — **1-800-MITAC-US**.

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CIRCLE 335 ON READER SERVICE CARD

GenTech

■ GRAPHICS FAMILIES

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Provision Model 340	\$4159	
COMPAQ COMPUTER		
COMPAQ 286/12 Model 40	\$1279	
COMPAQ 386/20 Model 50	\$1499	
COMPAQ Portable 386/20	\$3399	
MITRISHIR LAPTOP		
MS-3000	\$2649	
TOSHIBA PORTABLE		
10000 Portable	\$1709	
11200 10.5" Portable	\$2350/4999	
WYSE Computer All Models	SCALL	
ZENITH		
ZF-101/33 286 20MB Upgrade	SCALL	
ZF-101/33 20R	\$1330	
Supermodel 10002B	\$2179	
Supermodel 286 1000 28	\$2299	

PRINTERS

IMPACT PRINTERS			
BROTHER MATRIZ MS100		\$499/389	
HP-4010R-40		\$289/239	
EPSON			
LX-800	\$189	FX-800	\$239
FX-1000	SCALL	LC-500	\$339
FX-800	\$359	LC-1050	\$715
FX-800	\$429	LC-2500	\$899
PAULSON			
300-2400	\$449	DL-2400	\$495
DL-2500C	SCALL	DL-2400	\$545
NEWELL PACKARD			
DESKJET (budget laser printed)		\$1729	
Suggested Retail		\$1249	
Print Jet		\$1049	
OKI			
ML-321	\$305	ML-350	\$489
PANASONIC			
KCP-1000	\$185	KCP-100H	\$209
LASER PRINTERS			
HP LASERJET II		\$1799	
1 MB 1/2 MB MEM 80		\$309/479	
OKI LaserJet 60		\$2399	
NEC L2090 Silent Writer		\$3399	
DMS PS-4000/PS-4000 II		SCALL	
TOSHIBA Page Laser 12		SCALL	

SCANNERS

BATACOPY 700/800	\$1200/SCALL		
BEST 100/200 Scanner	SCALL		
HP Scanjet IIi Interleaf	\$1359		
MINICRITER MSF-300C	\$1589		
MSF-2000/4000	\$2879/3149		
QUICKAM-70 (Amber Laser) TOP	\$199		

MONITORS & TERMINALS

ANALOG 200/419	\$139/149		
GENIUS 4020 30"	\$585		
GENIUS 4020 30"	\$1359		
GENIUS CGA 15GA	\$265/375		
GENIUS SCAN	\$529		
HEC MULTISCREEN-CIS	\$1195		
GENIUS 4020 30"	\$585		
GENIUS PLUS/SLI	\$809/2229		
SAMSUNG SMD500 SCRM-PLAT	\$249/539		
CGA/EGA MONITOR			
SONY MULTISCAN 1300	\$599		
VIDEOM 10" W/ RGB C&B	\$1459		
WYSE 300/286 Monitor with video c&b	\$1749		
WYSE 300/286 10" MONITORAL	\$3009/439		
PRIMETON 11" 1000 T&S	SCALL		

FIRMWARE

THEYES MULTIFUNCTION CARD			
FOR PC/XT LIM MEMORY BOARD			
EXPANDABLE UP TO 1MB INCLUDES			
CLK/SER/PAW PORTS	\$39		
ATI VISA VISA GRAPHICS	\$259		
PARITE			
VISA PLUS	\$259		
VISA PROFESSIONAL	\$419		
VIDEO 7 VISA VISA	\$1285		
INTER ARVDSBOARD 286	SCALL		
VISA SERIAL 386 AT PC	SCALL		
DLA PCMA 216CA	SCALL		
NATES V SERIES M100M	SCALL		
BATASHELD 5-4MS-100 SUBOE			
SUPPRESSORS	\$599/69		
SUPERIOR ELECTRIC LINE			
UPS Backup Systems	SCALL		

NETWORKING

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NOVELL 16/14/12/8 IN VARI	\$399		
NOVELL V.31W SFT LEVEL	SCALL		
ACNET CARD	\$149		
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TOPS SOFTWARE FOR MAC	SCALL		
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available through supplemental driver disks.

The program also includes a built-in communications module to send images to Crosfield Dicommed World-Wide Service Bureau centers. There are approximately 50 of them throughout the United States and in Europe. These independently owned and operated centers process the image on Dicommed film recorders and will often use Dicommed's Imaginator design workstations to enhance the image. The turnaround time is 24 hours, and the cost per image is \$6 to \$10 depending on the individual bureau.

The company's newest raster-based product, *Synervision*, is currently being incorporated into the Crosfield Dicommed network of service centers.

Slideworks

Management Graphics offers a quartet of affordable graphics solutions. Since these products are upwardly compatible, they let you grow in a prescribed, modular fashion. Using the entry-level product *Slideworks*, for instance, you can create simple bar/line, pie, and text charts that can be either printed to a number of local proofing devices or transmitted, via modem or disk, to a Management Graphics workstation. There the image that you have created can be enhanced or output to

FACT FILE

Slideworks
 Management Graphics Inc.
 1450 Lodestar Rd.
 Downsview, Ontario
 Canada M3J 3C1
 (416) 638-8877
 List Price: \$245

Requires: 512K RAM; HDB hard disk; color/graphics adapter; DOS 2.1 or later.
In Short: This entry-level product for four PC applications works with its sister products to create a full slide production and management system. A handsomely designed symbol library and 255 colors are available. Not copy protected, but it requires special install and deinstall procedures.

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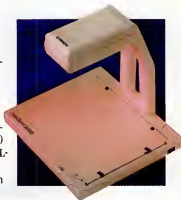
Best of all, DeskScan 2000 is much lower priced than most effective scanners. That means it's finally cost-effective to put a scanner on every PC user's desk.

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Scanners aren't just for desktop publishing any more. DeskScan 2000 becomes an economical FAX, with the simple addition of an inexpensive add-in board. Chinon sells

this exciting option and others in package combinations of bundled hardware and software—so that you have an affordable way of getting started with your scanner right away.

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CHINON

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■ GRAPHICS FAMILIES

the Matrix line of film recorders.

As with many of the other packages reviewed here, *Slideworks* is "intelligently" limited, so you create your graphics in a tightly controlled environment. This environment, however, offers an ample choice of colors, fonts, and output devices.

The package, for one, supports a wall-popping 255 colors. Eight colors can be invoked by typing their English names (black, blue, and so on); other color choices have a corresponding numerical code. Management Graphics includes the full printed color palette in its documentation, which makes it easy to choose attractive colors. *Slideworks* uses seven fonts, available in 90 type sizes, and has a built-in symbol library of 24 images. Its limited but well-chosen collection of local output devices includes the Epson and HP printer lines.

To enhance *Slideworks'* capabilities, you can purchase *Presentation Assistant*. At \$346, *Presentation Assistant* can access Bitstream fonts, plotter fonts, PostScript fonts, and a *Freelance*-like library of symbols. In addition, you can acquire supplementary drivers for Genigraphics, HP PaintJet, VideoShow, and MAGC corp interfaces as well as other output devices.

Finally, you can purchase Management Graphics' *Imager* or *Manager* software, which will perform a complete range of


***Slideworks' simple
function-key-driven
menus with only a few
variables per screen
help the nonartist
proceed methodically—
and confidently.***

slide imaging on Matrix film recorders. *Imager* (\$800) is a standalone workstation; *Manager* (\$1,605) is a multitasking system. In sum, for about \$3,000 (the special price for all four modules) you can have a complete graphics production facility at your command.

SLIDE THROUGH YOUR WORK An attractive package, *Slideworks* itself is a breeze to use. You can create pie, bar, line, tabular, and word and area charts. You can explode pie slices and create bar/line combination charts. Simple function-key-driven menus with only a few variables per screen help the nonartist proceed methodically. A spreadsheet form tailored

to each chart type lets you enter data or import ASCII data. A draw component lets you add graphics elements like lines, circles, arrows, and polygons. You can specify drop-shadows and rotated text to enhance your graphic. Foreign-language character sets are well supported.

You can queue your visuals to local devices or use the slide transfer utility to send your image to any of the 50 Management Graphics service centers worldwide. First you create a job that lists the visuals you want imaged; this job includes special processing, shipping, and billing. By adding comments to your job order, you can instruct the image center to add effects like graduated tone and transparent elements. Next, you use a modem and the transfer utility to transmit the images to the service center. Some of the Management Graphics service centers are equipped to process images produced from other software packages, including *Freelance Plus* and *Hardward Graphics*.

Imaging centers for *Slideworks* are independently owned and operated, but they generally offer slides that cost \$6 to \$10 with a 24-hour turnaround time; they also offer custom enhancements. Committed to remaining competitive in the PC arena, Management Graphics is currently working on a Windows-based version of its product. 

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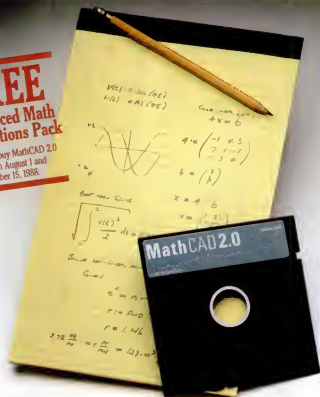
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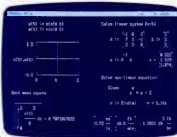
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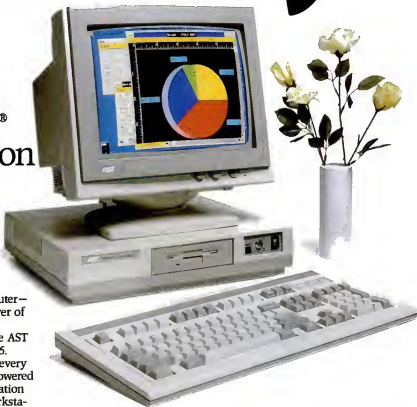
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fast, 40 MB hard disk drives and without. Even completely configured for a high-speed local area network.

A word of caution, though. Because of the AST Premium Workstation/286's small size, it's easy to forget the beast that lies beneath the surface. Once you turn it on, you're face to face with a lean, mean 10 MHz, 80286-based machine. With lightning-fast respon-

siveness, OS/2 and AT-software compatibility, AST's legendary EEMS and EMS 4.0 support, and up to 4 MB of system-board memory, the AST Premium Workstation/286 is able to fulfill almost any application need, from word processing, to spreadsheets, accounting and more.

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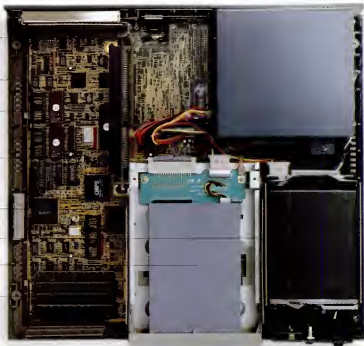
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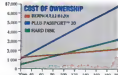


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GREAT GRAPHICS



Making Moving Pictures

Desktop animation packages are to traditional business graphics what Walt Disney's original *Steamboat Willie* was to the Sunday funnies: a radical and thoroughly engaging shift from static imagery to fluid motion. Not convinced? Consider the universal iconographic appeal of Mickey Mouse, Bugs Bunny, and Wile E. Coyote. Then ask yourself why Nikita Khrushchev, during his historic visit to the U.S., requested a tour of Disneyland so he could pose for the cameras beside a 6-foot USC undergraduate dressed in a Goofy costume. In short, animation works. Animated impressions are lasting impressions.

The current generation of desktop animation packages offer all the benefits of traditional animation plus something unique to PC-based technology—interac-

tivity. Studies indicate that people retain 20 percent of what they hear, 30 percent of what they see and hear, and a full 60 percent of what they interact with.

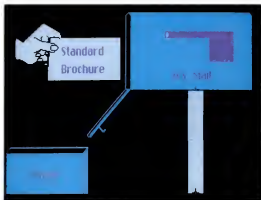
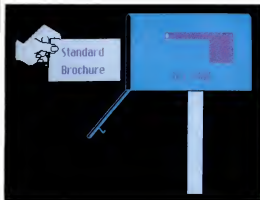
Hundreds of American corporations, in fact, already apply desktop animation packages in a variety of ways. Among them:

- Point-of-purchase—to attract and capture the attention of potential customers at trade shows, within showrooms, or in high-traffic retail areas.
- Direct mail—as product catalogs or advertisements, to generate or qualify sales leads, and to answer standard sales-call questions in lieu of a salesperson.
- Business and sales presentations—via laptop or projection TVs or other standard AV (audiovisual) technologies.
- Personnel training—used in conjunc-

*Animated presentations—graphics
that move across the screen—leave lasting
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■ DESKTOP ANIMATION



This simple but effective series, developed in Showpartner FX by EASI, of New York City, shows examples of a number of animated screen effects shared by the program's slide show and script editors. The story of the fate of most mass-mail pieces is told using modest images with basic effects such as Wipe (the letter sliding out from the mailbox), Scroll (appearance of the trash box), and Replace (letter dropping into the trash). In general, Showpartner's selection of effects achieve animation by means of either full or partial image overlays in specified directions and full or partial image movement to designated screen locations. A selection of three sounds (Noise, Slide, and Bomb) adds audio punch to your moving pictures.

tion with CBT (computer-based training) technologies.

■ Sales-call leave-behinds—as interactive rate cards for media or sales kits.

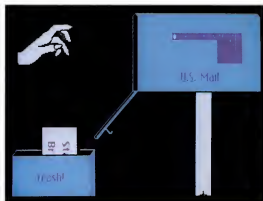
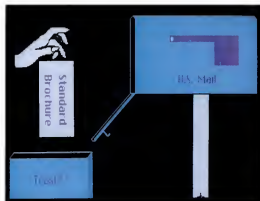
ANIMATION FEATURES Desktop animation packages employ a number of transitional screen dissolves to link sequential images. One simple dissolve, a *replace*, merely replaces the existing screen image with another. A *wipe* lays the new screen over the old from any of four directions: left to right, right to left, top to bottom, or bottom to top.

In a *box*, the new screen bursts outward from the center to the screen borders, or inward from the screen borders to the center. A *fade* replaces the old with the new via random bursts of pixels.

With the exception of Paul Mace Software's *Grasp*—perhaps the most powerful of the desktop animation packages mentioned below—these packages offer similar features and revolve around a linear script editor. The script editor is a file that contains all the data required to control the order of images; the type, direction, and speed of each dissolve; and the duration of each image, in addition to any required script or menu-branching instructions. Script editor interfaces generally offer point-and-click mouse selection from a qualified range for each desired image attribute.

It all seems simple on the surface, but a note of caution is required: the mere acquisition of desktop animation software does not imply an instant animation capability





any more than the possession of *Lotus 1-2-3* implies a balanced budget. The professional application of desktop animation software—like any other communications medium—generally requires professional talent in the form of art directors, illustrators, and copywriters.

Toss a qualified graphics programmer or two into the mix, and suddenly your initial animation software costs become just the tip of a much larger production iceberg. This accounts in part for the successful emergence of production houses and marketing agencies that specialize in the creation of animated interactive presentations and promotional campaigns. Some of these companies offer a full range of services, including not only the requisite technical firepower, but top-notch creative,

marketing, and fulfillment capabilities as well.

Five of the major players in the off-the-shelf animation software category are *Grasp*, *PC Emcee*, *PC Storyboard Plus*, *Showpartner FX*, and *VCN Concorde*. Here's a look at each.

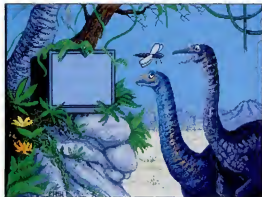
GRASP

Don't let its low \$149 price tag fool you: *Grasp* is clearly the hands-down winner in terms of sheer power, flexibility, and speed. Actually a graphics programming package with its own language, this one can do what the other packages do—and more—since it isn't bound to the default constraints of a sophisticated script editor interface.

Pictor, *Grasp*'s paint module, is deriv-

This colorful and sophisticated series of screens, developed by EASI for a monitor company, is an example of cell animation. With cell animation, each screen is drawn separately, then assembled in sequence to show advancing movement.

In this instance, the past meets the present as the flying insect pops to life from the jungle screen and finds its destiny in the jaws of the dinosaur. The only movement across the series is the changing position of the insect and the movement of the dinosaur's jaws in the final frame on this page. The sequence was developed in Showpartner FX using the special 256-color, high-resolution, 320- by 200-pixel MCGA mode supported by the program's Graftix editor.





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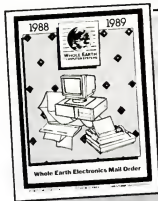
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■ DESKTOP ANIMATION

ative of *PC Paint*, an earlier effort by *Grasp* coauthor Doug Wolfgram, and is an excellent standalone product. But *Grasp*'s real power and beauty reside in its execution speed.

Grasp's editor (or any ASCII-capable word processor) coupled with any structured programming experience is enough to get you started. Using BASIC-like DATA statements, just a few lines of *Grasp* code will suffice to produce sophisticated animated sequences that shift image coordinates, adjust the palette, produce sounds, and branch to other scripts or outside programs. Furthermore, *Grasp* commands can be incorporated into C, BASIC, Turbo Pascal, and other shell programs. The result? Animation appears smooth and effortless, even when several objects on the screen move concurrently.

Grasp's documentation does little to help the animation neophyte; indeed a working knowledge of basic animation

techniques is essential to the professional application of any desktop animation product. But the on-line *Grasp* BBS allows users to download completed examples of *Grasp* presentations and artwork. If all you want to do is generate automated slide shows, choose another package. But if professional-quality animation is your objective, choose *Grasp*. Nothing else even comes close.

PC EMCEE

Unlike the other products mentioned here, *PC Emcee* (\$995) is designed for one primary application: desktop business and sales presentations. And as the name implies, *PC Emcee* provides a complete computer-enhanced system for a presentation's actual delivery.

Bundled with a freestanding Presentation Coprocessor that connects to any standard serial port, *PC Emcee* sequences computer images into any desired order,

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■ DESKTOP ANIMATION



FACT FILE



Group, Version 3.1
Paul Mace Software
Ashland, OR 97520
(503) 488-0224
List Price: \$149
Requires: 512K RAM;
CGA, EGA, VGA, or
MCGA display; DOS

2.0 or later. Not copy protected.

CIRCLE 067 ON READER SERVICE CARD



PC Emcee, Version 1.1
Computer Support Corp.
15926 Midway Rd.
Dallas, TX 75244
(214) 661-8960
List Price: \$995
Requires: 640K RAM;
EGA or VGA display;

DOS 2.0 or later. Not copy protected.

CIRCLE 068 ON READER SERVICE CARD



**PC Storyboard Plus,
Version 1.01**
IBM Corp.
Montville, NJ 07645
(201) 930-5022
List Price: \$350
Requires: 320K RAM;
CGA, EGA, or VGA dis-

play; DOS 2.1 or later.

Not copy protected.

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**Showpartner FX,
Version 3.2**
Brightbell-Roberts &
Company, Ltd.
120 E. Washington St.
Syracuse, NY 13202
(315) 474-3400
List Price: \$350

Requires: 640K RAM; IBM PC with one
floppy disk drive and hard disk; Hercules,
EGA, or VGA display; DOS 2.0 or later.
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**VCN Concorde,
Version 3.0**
Visual Communications
Network
238 Main St.
Cambridge, MA 02142
(617) 497-4000
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■ DESKTOP ANIMATION

ture program), Story Editor (a linear scripting interface to sequence and animate screens), and Story Teller (to display scripts created with Story Editor).

PC Storyboard Plus (\$350) is the oldest package of the bunch, and it offers the most concisely referenced documentation. It is also the easiest to use, thanks to its straightforward story editor interface. *PC Storyboard* was in fact the first popular desktop animation package to employ the linear script editor, a generic concept that has since been emulated and refined by competitive products.

Despite the full array of tools, one feature truly distinguishes *PC Storyboard Plus* from the other packages mentioned here: the letters "IBM" on the package.

SHOWPARTNER FX

Showpartner FX is remarkably easy to use when you consider all that it does. The folks at Brightbill-Roberts are committed

to providing the end user with every tool required to produce high-quality animated presentations, and *Showpartner FX* reflects their commitment.

Showpartner's well-deserved best-seller status has encouraged much third-party-developer support, including special drivers for input and output devices, digitized video and sound, and touchscreen input. New bells and whistles, scripts and artwork are available for downloading via the *Showpartner BBS*. And *Showpartner* scripts can be called via C, BASIC, or Turbo Pascal shell programs.

VCN CONCORDE

VCN Concorde offers all of the features provided by *PC Storyboard Plus*, and it adds complete desktop publishing support via TIFF and PostScript (.EPS) formats. This, however, may not justify the additional \$345; *VCN* retails for \$695.

One of the program's best attractions is

a substantial high-resolution image library—over 100 professionally rendered EGA and VGA images collected through the vendor's work for major companies. Other image and animation libraries are available separately. Library categories include business icons, international maps, transportation, city skylines, decorative design, sports, and personalities.

While *VCN* offers faster execution speed than *PC Storyboard Plus* or *Showpartner FX*, *VCN* is tougher to use because of inconsistencies among its module interfaces and a steeper learning curve for creating images and laying in script commands. Version 4.0, expected to be released before publication of this issue, aims to correct these shortcomings.

If you don't have the artistic firepower on staff to develop your own image library, and you don't want to contract a professional production house, *VCN Concorde* might be the package for you. ☐

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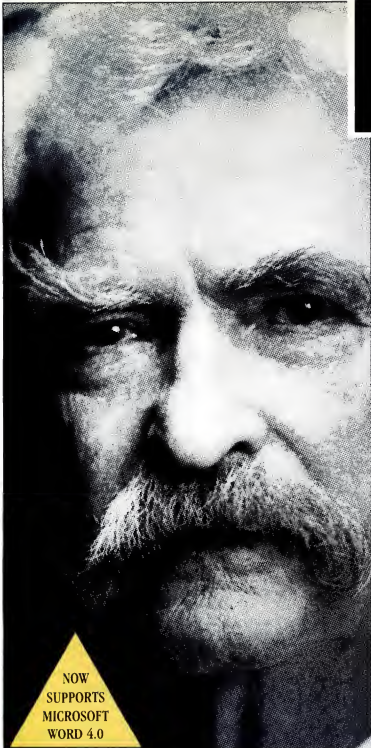
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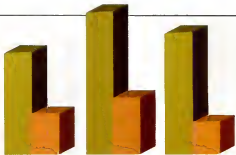
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Designing **GREAT GRAPHICS**



Slide Fare for the Common Man

Buying into the offerings of companies like Genographics is one way to ensure high-quality 35mm output for your computer graphics (see "Adopting a Graphics Family"). But occasional presenters, who prefer to declare their software independence and shun the cost and setup that goes with buying a single vendor's products and services, may find their needs met by the growing number of independent service bureau options.

Using an independent service bureau is like hiring a personal film technician: you use your tools to create the image and then send it to the bureau for processing via modem or messenger. These bureaus range in size from small, local t-shirt-and-pop shops to large automated installations that can

handle significant bulk with fast turn-arounds.

There are many advantages to having your images processed at remote locations. You get high-end output without the expense and bother of purchasing and maintaining costly film recording equipment. You can take advantage of a variety of pricing schemes that graduate according to how fast you need the job done. Best of all, when you use an independent service bureau, you are not married to one particular graphics software package. You can use whichever software package fills your bill. But caveat emptor! Because service bureaus come in so many flavors, and because they offer varying degrees of support for different graphics products, you should

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of slides and transparencies.*

■ SERVICE BUREAUS

proceed with a fair amount of caution.

Ten dollars per slide is not an uncommon charge at a service bureau. Not all bureaus maintain all kinds of film recorders, although most can produce slides from a Computer Graphics Metafile (.CGM format). CGM, however, does not always produce slides exactly as you've composed them on-screen. Retakes, if you need them, mean another round of charges, and the costs add up. For all those reasons, it is a good idea to investigate the costs and offerings of a service bureau before deciding on one to use.

The only real certainty among the various service bureaus is that there is no consistency, but there are some generalities worth mentioning. Generally, you use "off-the-shelf" graphics software to develop an image and then send the image (via either disk or modem) to the bureau for processing on a high-end output device. Slide output is the most commonly requested media, although each bureau typically offers color hard copy, color transparency, black-and-white laser hard copy, and sometimes even video.

Any one of the major-brand high-end film recorders can be used to create either 2,000-, 4,000-, or 8,000-line-resolution slides. The most popular service bureau film recorder brand appears to be Matrix, because of that company's aggressive pricing and the fact that most serious business graphics packages include a Matrix driver. Others to be found in the bureaus include the more-expensive Celco camera and the less-expensive Calcomp Samurai. A variety of options such as pin registration (a way of precisely aligning a series of slides) and glass mounting are typically available.

The price ranges from \$8 to \$15 for a 35mm slide with 24-hour turnaround (this sometimes includes delivery time but often does not). Economy rates, for those who can wait 2 days, typically slash one third off the price. Rush orders are almost always available, but you generally pay a 50 percent additional charge. Also, most of the bureaus don't deliver; they rely on third-party messengers such as Airborne, Federal Express, or local messenger services to deliver the slides to you.

In the last few years we've seen a service bureau explosion. Companies with roots in traditional color lab processing

have purchased digital film recorders in an effort to capitalize on the growing number of computer graphics users. Companies that specialize in custom graphic design have also entered the imaging fray, offering imaging in addition to their design services. A walk through your local Yellow Pages will give you ample ammunition to investigate the options. Your best bet is to

*In the last few years
we've seen a service
bureau explosion, with
many companies trying to
capitalize on the growing
number of computer
graphics users.*

call the bureau, tell its staff what graphics software you use, and find out what they can do for you. We've focused on a sampling of the bureaus that reflects the nature of the beasts.

CLICK SHOP VS. CUSTOM ART

Within the service bureau fracas, one distinction is evident. Bureaus are either what we nonpejoratively call "click shops," or they are custom art centers. Click shops, like their counterparts in the film processing world, don't offer custom service or enhancements; they simply make slides of whatever comes down the line. In contrast, there are service bureaus that sell enhanced services. So, for example, if you need a corporate logo, a sunburst effect, or a graduated-tone background incorporated into your slide, but your software can't do it, you can have it done at the bureau, prior to imaging. As you naturally would expect, these custom services cost money. And often they are the real meat and potatoes of the organizations that offer them.

The granddaddy of bureaus, and the prototype for many of the new service bureaus, is MAGIcorp in Elmsford, New York. In fact, MAGIcorp holds the patent for the method of transmitting information

via modem for the production of slides. The company licenses the technology to other bureaus. MAGIcorp supports a wall-to-wall 24 graphics programs, including *Freelance* and *Lotus Graphwriter*, *Harvard Graphics*, *Microsoft Chart*, *35mm Express*, *Pixie* and *Mirage*, GEM products, and *Lotus 1-2-3*. They are also the exclusive slide makers for Ashton-Tate's new *Draw Applause* and *Master Graphics* series. MAGIcorp processes slides using a \$25,000 Celco (8,000-line) film recorder, one of the finest machines in the film recorder business. The standard price for 24-hour turnaround is \$15, plus the additional delivery fees.

The way you use MAGIcorp's service depends on your software package. In some instances, the MAGIcomm driver (the company's proprietary communications link between software and the Celco film recorder) is built into the program, as it is with *35mm Express*. You select MAGIcorp from the output menu without exiting the graphics program, and the file is transmitted. In other instances you'll need to create a special graphics metafile and then run the MAGIcomm disk to transfer the information. MAGIcomm includes a telecommunications program and a job order form that prompts you for billing and delivery information. MAGIcorp, unlike many other bureaus, provides a toll-free number that eliminates heavy access-time charges.

LOCAL CUSTOMS In contrast to MAGIcorp's "click" strategy are shops that offer full-service enhancements. These shops tend to be smaller and will often prepare each slide on a more manual, individualized basis. They tend to be local shops. Brilliant Image is one such local shop with a national reputation for providing enhanced slide-making services. It accepts slides via disk or modem, using any off-the-shelf communications package with the Xmodem protocol, and supports imaging of at least 13 different PC graphics packages. You can transmit a file to Brilliant Image's Matrix (4,000-line) film recorder for only \$10 a slide, or you can give a holler to Computer Picture Services, the custom service arm of the company. For approximately \$150 an hour, Computer Picture Services provides custom art

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■ SERVICE BUREAUS

services. The service can enhance an image such as a 1-2-3 graphic using more-sophisticated software, or design a slide or entire presentation from scratch. It also provides as part of its standard fare, critiquing and advisory services.

Another example of a full-service company is Visual Horizons. This 18-year-old company specializes in materials for meetings and presentations. It offers 35mm-slide output from at least 15 PC-based software packages, including some that aren't supported by most other bureaus, such as *Show Partner*, *AutoCAD*, *VCN Concorde*, *PC Storyboard*, and *PC Paintbrush*. Its slides can be transmitted via modem using *Transgraphic*, a software program sold by Visual Horizons that's designed to optimize graphic's transmission. Output is to a Calcomp Samurai or Matrix film recorder at 4,000-line resolution. The cost per slide is \$9 with 24-hour turnaround, and volume discounts are available.

In addition to computer imaging, Visual Horizons offers a broad range of custom services, including scripting and story-

boarding a presentation, generating special-effects art, and offering a large graphics library of over 7,000 stock images.

In addition to computer imaging, Visual Horizons' broad range of custom services includes access to a graphics library of over 7,000 stock images.

Bonnie Arnold, a spokesperson for the company, said that it handles virtually any job, and that simple customized text slides can cost as little as \$12.50, with complex slides costing hundreds of dollars. Visual Horizons also has a catalog of products

that reads like a Christmas wish list from the boardroom; included in this list are such items as marking pens, slide carousels, light tables, projectors, and storage cabinets.

SERVICE VARIATIONS Other service bureaus offer some interesting twists on the basic service that are worthy of consideration. The ultimate no-hassle graphics are created with Expresslides. This service actually lets you create slides even if you don't have access to a PC or to a graphics software package.

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50 Executive Blvd.
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(914) 592-1244

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In Short: The granddaddy of service bureaus, MAGIcorp patented the process by which you can transmit graphics to service bureaus by modem. Supports 24 graphics programs and produces slides on a Celco 8000-line film recorder.

CIRCLE 671 ON READER SERVICE CARD

Visual Horizons

180 Metro Park
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In Short: Selling everything from marking pens and slide carousels to custom art services, this company specializes in products for presentations and meetings. Support for animation and paint software as well as business graphics. Outputs to Calcomp Samurai or Matrix film recorders.

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■ SERVICE BUREAUS

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An Expresslide costs \$9.95 with standard 1-day turnaround. A special \$5.95 super-saver rate is available for 2-day processing. In addition, Expresslides is affiliated with Management Graphics of Minneapolis, Minnesota, and provides imaging for its graphics software package, *35mm Express*. Expresslides also supports a number of packages that can drive Matrix film recorders, including *Harvard Graphics* and *Lotus 1-2-3*.

CompuFilm is a service bureau in a box. Selling for \$150 (suggested retail), CompuFilm is a tidy package with everything you need (except your graphics software) to create ten 35mm slides, plus a \$25 flat rate for Federal Express delivery. You create your graphics with *Harvard Graphics*, *Freelance*, *Microsoft Chart*, *Lotus Graphwriter II*, or any of a number of supported packages, and then use the CompuFilm disk to interactively prepare the work order. A Federal Express mailer and waybill are included in the kit. Graphics are processed on a Matrix camera at 4,000-line resolution, and turnaround time is approximately 2 days. Federal Express's overnight-delivery charges are additional. CompuFilm's most endearing quality is the lack of telecommunications/modem headaches. However, the company plans to launch a modern transmission scheme soon.

WHAT HAVE YOU GOT TO LOSE?

Service bureaus are a bright alternative worthy of serious consideration, but you should consider their pitfalls as well as their advantages. Experience will teach you lessons about their hidden costs.

It's not uncommon to have 20 to 30 slides in a presentation, and if all are produced at a service bureau, that will cost you between \$200 and \$300. It's also common to make mistakes and to need to correct them in a hurry. By the time you're done with modifications and the rush fees they incur, you can easily add 50 percent to your costs.

Other hidden costs, and delays, include expensive messenger delivery. If you are a bulk user of slides, you may consider purchasing a film recorder that can produce in-house slides for less than a dollar a slide.

Keep in mind, though, that film recorders entail other costs. In addition to spending \$10,000 on the purchase, you will need personnel to maintain and operate the equipment.

Another thing to consider is how public you want your data to become. Confidentiality is another good argument for keeping production in-house. And finally, if you're sending your files by modem, line noise can be a serious problem. Modern communications is also a less-than-perfect science. Inevitably you'll be plagued by noisy phone lines and poor connections. The probability of maintaining a clean line for the time it takes to transmit mammoth-sized graphics files is slim if you're sending, say, 20 files to be used in a single presentation.

After weighing all those concerns, you should consider the quirky nature of computer slide production. Because service bureaus take your graphics information and sometimes imperfectly map it to film recorder devices, you may be in for some surprises.

What you see on your display screen is, all too often, not what you receive in your slide. It's common for aspiring slide makers to create slides with text running off the edges, lines that are too thin to show up on the projected screen, colors that either don't project or don't work well together, and graphics elements that were in one place on the display screen but have migrated in the slide. Don't get me wrong; this is a criticism of each software package's support for film recorder devices—and not the service bureau. Nonetheless, the burden of proof is on the service bureau, and the disappointment is in your hands if the slides you carry into a presentation don't look like what you prepared with your software.

Computer graphics service bureaus are still a young and exciting concept. We expect that, as software vendors create better film recorder drivers, as users learn to maximize a package's slide capabilities, and as service bureaus broaden their support, the prognosis looks good for receiving dazzling images from these operations. □

Robin Raskin is a contributing editor of PC Magazine.

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■ UTILITIES ■ SALVATORE P. RICCIARDI

TURNING .COM FILES INTO BASIC

MAKEBAS converts binary files into BASIC ASCII programs that you can send over communications systems and then reconvert to their original form by running once in BASIC.

If you've ever wanted to send a spreadsheet over MCI Mail or create the kind of .BAS listings you find in this column, then MAKEBAS.COM will interest you. MAKEBAS.COM is a utility that lets you translate short binary files—charts, spreadsheets, executable programs, and the like—into straight ASCII text form inside a BASIC program that re-creates the original when run.

Most communications software packages handle ASCII text characters with ease. But when handling binary files, communications programs must use an error-checking protocol to ensure absolute accuracy. At the transmitting end, for example, the protocol may be implemented by appending a *checksum* value to each block of data sent. The checksum is calculated by adding up the numeric values of all of the characters in the block. The receiver then compares the checksum to its own summation of the bytes in the block. If any discrepancies are found, the block is retransmitted.

MCI Mail, a commercial electronic mail service, has its own error-checking binary protocol, which is implemented in *Lotus Express*. But transferring a spreadsheet or executable file involves handling binary "attachments" as separate files. With MAKEBAS you can include the file directly in a message. The recipient can then extract the BASIC program and run it once to re-create the original file.

MAKEBAS avoids the usual protocol requirement by converting the binary data into ASCII hexadecimal format. MAKEBAS also implements arithmetic check-

sums to ensure the accuracy of the data. Thus, each data statement contains a line checksum as the last data item. This value is read and compared with the calculated sum of all of the preceding bytes in that data statement, as shown in Figure 1. If they're not equal, it's likely there's an error in one of the data items. But what if an

error is made in a data item and the line checksum? For example, what if both were off by +1? In such a case the line-checking operation would not detect the error. For that reason a second, global checksum is calculated and placed in the last data statement. It is read and compared with the sum of *all* the data statements to provide an added measure of security.

MAKEBAS.COM itself can generate a BASIC program for any size file, but in practice it can only be used on files of approximately 12,000 bytes or less. This is because most versions of BASIC, including the BASICA interpreter that comes with most IBM machines, can't handle BASIC programs larger than 64K. A 12K input file run through MAKEBAS produces a BASIC program approximately 64K in size.

GETTING AND USING MAKEBAS

The easiest way to get MAKEBAS is to download it from PC MagNet, the *PC Magazine* on-line service, as explained in the sidebar "MAKEBAS by Modem." If you don't have access to a modem, you can create MAKEBAS.COM by assembling MAKEBAS.ASM, the source file that accompanies this text. Alternatively, like other programs and utilities we publish in the Productivity section of the magazine, you can also create MAKEBAS by keying in and running the MAKEBAS.BAS program, also listed here. That way, MAKEBAS.BAS creates MAKEBAS.COM, even though MAKEBAS.BAS itself was created from MAKEBAS.COM!

To use MAKEBAS, just give it the

PRODUCTIVITY INDEX

UTILITIES

Convert binary files into BASIC ASCII programs with MAKEBAS.

ENVIRONMENTS

The Presentation Manager dialog box procedure explained.

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How to implement the Quickstart routine in assembly language.

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■ UTILITIES

```

276 DATA B8, 48, 0, 8E, D8, A1, 0, 0, 8B, 1E, A, 0, 89, 1E, 0, 0, 469
280 DATA A3, A, 0, C3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 170
298 DATA 1497

```

Figure 1: The shaded areas highlight CHECKSUM usage in the BASIC program created by MAKEBAS.COM.

name of the file to be translated and it will create a .BAS program of the same name. The syntax for MAKEBAS is

MAKEBAS [d:][path]filename[.com]

where *d* is the drive letter (if other than your current one), *path* stands for the sub-directory (again, needed only if different), and *filename* stands for the source file. If no three-letter file extension is provided, MAKEBAS will supply .COM as a default, so you must enter extensions such as .WK1 in order to retain them when the .BAS file is reconverted to its original form. Note that the re-created files will often be several bytes longer (up to 15 bytes of 0's at the end of the file) than the originals. However, this should not affect their execution.

The programs that MAKEBAS creates can be run under IBM's BASICA, GWBASIC, QuickBASIC, Turbo Basic, or any BASIC interpreter or compiler compatible with Microsoft BASIC. The data statements created by MAKEBAS represent a binary image of the original executable file. When run, the .BAS version re-creates the file stored in its data statements. Executing

MAKEBAS DR.COM

for example, produces DR.BAS, whose data statements, in hex, are a direct translation of the machine (binary) code of DR.COM. The BASIC interpreter or compiler reads the data stored in these data statements and re-creates DR.COM by writing them to disk.

MAKEBAS stores the BASIC files it produces in the same subdirectory as the source file. So, if the source file is C:\UTIL\CO.COM, the BASIC file will be C:\UTIL\CO.BAS. If you already have a BASIC file with that name in the sub-directory, MAKEBAS asks for confirmation before it overwrites the existing file. Any answer other than "Y" or "y" terminates the program.

If an error occurs when opening or reading the source file, the message "MAKEBAS: Source file error" will be displayed and the program will end. This could occur if the source filename was entered incorrectly and MAKEBAS discovers that it does not exist, for example. Similarly, if an error occurs while writing the .BAS file, the message "MAKEBAS: .BAS file error" will be displayed and the program will end.

HOW MAKEBAS WORKS The MAKEBAS program logic has two main parts. The first part creates the BASIC program structure (a "template") which it fills and writes to disk. The second part creates the BASIC data statements. It reads the source file 16 bytes at a time and creates a BASIC data statement from each group.

The relationship between these parts

can be seen by comparing Figures 2 and 3. Figure 2 shows the complete BASIC listing produced by MAKEBAS for the LPTPORT.COM utility that appeared in the March 5, 1985, issue of *PC Magazine*. Figure 3 is a complete hexadecimal dump of the LPTPORT.COM file. You'll notice that the data statements in the BASIC program contain the same hexadecimal characters as shown in the hex dump except that leading zeros are not included. Thus, when a BASIC program is created by MAKEBAS, it includes a complete copy of the file that it will re-create.

MAKEBAS.ASM includes a section of its data area (starting at label BASIC_CODE) devoted to holding a template of the BASIC program. I call it a template because there are several blanks to be filled at start-up time. For example, space must be reserved in several places for the filename.ext of the source file (see labels FLNAME and FLNAME1). The BASIC program needs this information to know what filename to create when it is run. Similarly, space is reserved for a count of the number of BASIC data statements (see label LINECOUNT). One of MAKEBAS's tasks is to obtain this information and fill in the blanks that are shown in the

```

100 REM - BASIC PROGRAM TO CREATE LPTPORT.COM
110 CLS:PRINT "Creating LPTPORT.COM ": OPEN "LPTPORT.COM" AS #1 LEN = 1
120 FIELD #1, 1 AS A$: CHECKSUM=0
130 FOR I = 1 TO 2
140 LINECOUNT=0: LOCATE 2,3: PRINT "Countdown: " 2 - I ;
150 FOR J = 1 TO 16: READ BYTES: CHECKSUM=CHECKSUM+VAL("A$"+BYTES)
160 LINECOUNT=LINECOUNT+VAL("A$"+BYTES)
170 IF (BYTES < 256) THEN LSET A$=CHR$(VAL("A$"+BYTES)): PUT #1
180 NEXT J
190 READ LINETOTS: LINECHECK= VAL("A$"+LINETOTS)
200 IF LINECHECK=0 THEN GOTO 220
210 LOCATE 4,2: PRINT "Error in line #": 248 + 18 * I: GOTO 268
220 NEXT I
230 CLOSE: READ FILETOTS: FILECHECK= VAL(FILETOTS)
240 IF CHECKSUM<>FILECHECK THEN GOTO 268
250 PRINT: PRINT "LPTPORT.COM created successfully": SYSTEM
260 PRINT: PRINT "LPTPORT.COM is not valid!" : END
276 DATA B8, 48, 0, 8E, D8, A1, 0, 0, 8B, 1E, A, 0, 89, 1E, 0, 0, 469
280 DATA A3, A, 0, C3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 170
298 DATA 1497

```

Figure 2: The .BAS program for LPTPORT.COM. The shaded characters correspond to those shown in Figure 3.

```

3A77:0100 B8 48 00 8E D8 A1 00 00 8B 1E 0A 00 89 1E 00 00 469
3A77:0110 A3 0A 00 C3 00 00 00 00 00 00 00 00 00 00 00 00 170

```

Figure 3: A hex DUMP of the program LPTPORT.COM. A complete copy of the shaded characters is contained in the BASIC program shown in Figure 2.

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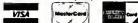
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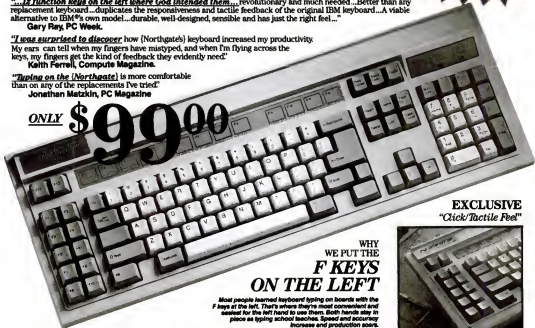
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```

COPYRIGHT  DB "MAKEBAS 1.0 (C) 1988 Ziff Communications Co.",CR,LF
DB "PC Magazine ",254," Salvatore P. Ricciardi",CR,LF
DB "CR,LF,"
USAGE       DB "Usage: MAKEBAS (d:)[\path\]filename[.ext]",CR,LF,"S"
DB "I&H"
BASIC CODE  DB "190 REM = BASIC PROGRAM TO CREATE "
FLNAME     DB "12 DUP(" ),CR,LF
DB "110 CLS:PRINT "--Creating "
FLNAME2    DB "12 DUP(" )
DB "110 DFEN ---"
FLNAME1    DB "12 DUP(" )
DB "110 AS $1 LEN = 1",CR,LF
DB "120 FIELD $1,1 AS A$: CHECKSUM$="",CR,LF
DB "130 FOR I = 1 TO "
DB "5 DUP(" ),CR,LF
DB "140 LINESUM$=: LOCATE 2,3: "
DB "PRINT "Countdown: "
COUNTDOWN DB "5 DUP(" )," - 1 ",CR,LF
DB "150 FOR J = 1 TO "
DB "3 DUP(" ),": READ BYTES: "
DB "CHECKSUM$=CHECKSUM$+VAL("+"*"+BYTES)
DB "CR,LF
DB "160 LINESUM$=LINESUM$+VAL("+"*"+BYTES)",CR,LF
DB "170 IF (BYTE < 256) THEN LSET AS=CHR$
DB " (VAL("+"*"+BYTES)): PUT $1",CR,LF
DB "180 NEXT J",CR,LF
DB "190 READ LINETOTS: LINESUM$ = VAL("+"*"+LINETOTS)
DB "CR,LF
DB "200 IF LINESUM$ = LINESUM$ THEN GOTO 220",CR,LF
DB "210 LOCATE 4,2: PRINT "Error in line $" ;"
DB "5 DUP(" )," "
DB "3 DUP(" )," * I: GOTO 240",CR,LF
DB "220 NEXT I",CR,LF
DB "230 CLOSE: READ FILETOTS: FILECHECK$ = VAL(FILETOTS)
DB "CR,LF
DB "240 IF CHECKSUM$ <> FILECHECK$ THEN GOTO 260",CR,LF
DB "250 PRINT: PRINT ---"
FLNAME2    DB "12 DUP(" )
DB "260 IF NOT SUCCESSFULLY:=" SYSTEM",CR,LF
DB "260 PRINT: PRINT ---"
FLNAME3    DB "12 DUP(" )
DB "270 IF NOT VALID:=" END",CR,LF

```

Figure 5: One of MAKEBAS's first tasks is to fill in the blanks that are shown in the BASIC program template.

CIIZ terminator. And rather than attempt to shift the filename left to account for leading blanks, MAKEBAS determines where the first nonblank character really starts and saves that position in a safe place for later use. Then, when DOS needs the address of the ASCII filename string, MAKEBAS will substitute the real starting position instead of PSP:81H.

Once the file specification is found and stripped of any trailing blanks and tabs, the STRUPPER procedure is called to convert it to uppercase. If no file extension was specified, the default, ".COM", is appended. Rather than move the filename to a separate data area, the extension is just appended directly to the filename currently in the command tail.

FILLING IN THE BLANKS At this point the command tail contains the name of the source file in a complete ASCII string. However, this could be a 12-char-

acter filename.ext or a longer full file specification, since MAKEBAS does not restrict operation to files in the current directory. The BASIC program template has several areas in which the name of the source file needs to be inserted, but there's only room for the 12-character name. In order to fill in these areas the FILENAME procedure is called, which returns the starting position and length of the "filename proper," which is then moved into the appropriate places in the template.

When MAKEBAS creates the BASIC program, it uses the same filename as the source file and simply changes the original file extension in the program segment prefix to .BAS. When opening the file, the DOS Open File Handle function is used instead of the Create File Handle function, because the latter function automatically truncates existing files and we want to decide whether or not to overwrite existing files at runtime. If the open call succeeds,

then a .BAS file already exists and MAKEBAS prompts for verification before overwriting the existing file. Any response other than "Y" or "Y" terminates the program. If the response is yes, MAKEBAS uses the Create File Handle function, truncating the old file.

LINE NUMBERS The BASIC program created by MAKEBAS needs to know how many data statements there are in order to know how many to process. Space is reserved at the label LINECOUNT in the template for that number. Since the data statements created by MAKEBAS represent a binary image, every byte in the executable file will be represented by a two-character hexadecimal constant in a BASIC data statement. As 16 bytes are to be contained in each data statement (the BYTES_LINE equate is set to 16), the number of data statements required can be calculated by dividing the total number of bytes in the source file by 16 and adding 1 if there is any remainder.

The size of a file can be determined by using function 42h, Move File Pointer. DOS tracks its position within a file in a variable known as the file pointer. Once a file is open, this variable is continuously updated to reflect an offset from the beginning of the file. The Move File Pointer function can be used to change this value and affect DOS's position within a file. It moves the file pointer to an offset address that is specified in the CX:DX register pair. An option is provided so that the file pointer can be moved three different ways: to a position offset from the beginning of the file, to a position offset from the previ-

DOS Segment Register Initialization

Segment register	Executable file type	
	.COM	.EXE
CS	PSP	—
DS	PSP	PSP
ES	PSP	PSP
SS	PSP	—

Figure 6: This table identifies which segment registers contain the segment address of the PSP at start-up time.

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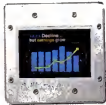
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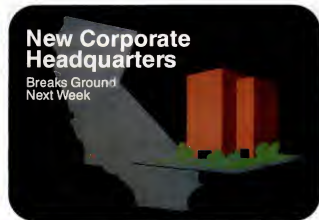
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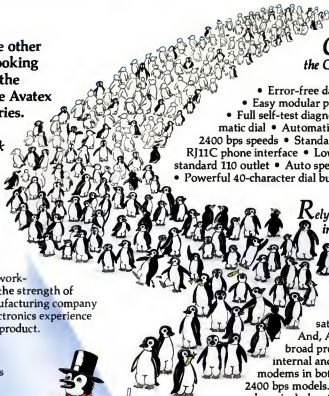
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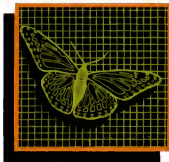
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■ UTILITIES

MAKEBAS BY MODEM

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MAKEBAS.COM is already compiled and ready to run. MAKEBAS.BAS will automatically create MAKEBAS.COM when run once in BASIC. MAKEBAS.ASM allows you to modify the program but requires you to use a macro assembler (IBM or Microsoft, Version 2 or later) and the following commands:

```
MASH MAKEBAS;
LINK MAKEBAS;
EXE2BIN MAKEBAS MAKEBAS.COM
```

Photocopy this page. Trim and hole-punch the copy and add it to your DOS manual.

MAKEBAS
Command

Salvatore P. Ricciardi

1988 No. 16 (Utilities)

Purpose:

Converts binary files into an ASCII text format contained within a BASIC program that will re-create the original binary code when run. Used to transmit executable programs, spreadsheets, charts, etc., over communications services that do not permit sending binary files.

Format:

MAKEBAS [d:][path]filename[.com]

Remarks:

Entered with the *filename* of a binary file (preceded by its drive [d:] and *path* if other than current), MAKEBAS produces a ready-to-run BASIC program that is stored in the same drive and directory as the source file. The data statements in the created .BAS file represent a hex image of the bytes that constitute the source file's original binary (machine) code. Source files of up to approximately 12,000 bytes can be converted while staying within the usual 64K .BAS file limit.

By default, MAKEBAS presumes the source file has a .COM extension, but other extensions (.WK1, for example) can be preserved by entering them as part of the filename.

Files created with MAKEBAS can be reconverted to their original form by being run under IBM BASICA, GWBASIC, QuickBASIC, Turbo Basic, or any BASIC interpreter or compiler compatible with Microsoft BASIC. Note that up to 15 ASCII nulls may be added at the end of the restored binary file, but these will not affect its operation.

In addition to converting executable code into a form that can be sent, for example, over MCI Mail, MAKEBAS.COM is the program used at *PC Magazine* to produce the BASIC listings of its Utilities programs.

■ UTILITIES

conversion, it is written to the .BAS file on-disk using the DOS Write To Handle function (40h). The procedure WRITE_TO_HANDLE is called to do this.

Most DOS interrupt 21h functions have the ability to notify the calling routine that an error has occurred by setting the carry flag. In this way, when the function returns control to the calling routine, a JC (jump if carry flag is set) instruction can be used to jump to an error handler if the carry flag is set. There are some instances, however, when DOS does not report an apparent error condition by way of the carry flag, and these include the failure of the DOS Write To Handle function to set the carry flag when a disk-full condition is encountered. This lack of consistency is easily remedied by programmatic means. It becomes the responsibility of the calling routine to compare the number of bytes written to disk with the number of bytes requested to be written to disk, in order for the calling rou-

■ There are instances when DOS does not report an apparent error condition via the carry flag.

tine to determine if an error has occurred. As a result, the Write To Handle procedure will return with the carry flag set under all error conditions.

GENERATING DATA STATEMENTS

The rest of the MAKEBAS code is devoted to operating in a loop, repeatedly creating data statements until the entire input

file has been represented. First, the input file pointer is reset to the beginning of the file, using the Move File Pointer function. Then, the loop begins by calling the READDATA procedure to read the next 16 bytes from the source file into a buffer.

An area for the BASIC data statement is reserved at label BASICDATA. MAKEBAS reuses this area as it creates each data statement. Its first task is to calculate an appropriate BASIC line number. The LINENUM procedure calculates and creates the next line number, converts it to decimal ASCII, and stores it at label BASICDATA. This is done by multiplying the current line number by the LINE_INCR equate (the line number increment), and then adding in the line number of the last BASIC statement prior to the data statements (see LASTBASIC). So, using the default values, the line number calculation is $(1 * 10) + 280 = 290$.

Since the BASICA interpreter cannot

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handle line numbers greater than 65535, MAKEBAS provides a check in the LINE-
NUM procedure that returns an "Error,
line number too big" message and then
terminates the program if the line number
is too large.

MAKEBAS then turns to the MAKE-
DATA procedure to generate the hex data
for the data statement. This procedure has
several responsibilities. First, it takes each
byte from the read buffer, converts it into
2-byte hexadecimal ASCII format (using
the PUTHEX procedure), and stores it
(followed by a comma) in the data state-
ment template. Second, MAKEDATA
calls LINESUM to add up the values of
each of the 16 bytes to produce a line
checksum. This checksum is used by the
BASIC program to verify the accuracy of
the data in the data statement. Third, it
converts the checksum to ASCII hexadecimal
and stores it at the end of the data state-
ment, followed by a carriage return/line

■ MAKEBAS makes it easier to exchange binary files with others and creates BASIC programs that require less room.

feed combination (see the LINESUM pro-
cedure). Fourth, it handles lines of less
than 16 characters by padding up to the end
of the line with 00.

After the MAKEDATA procedure
completes, the loop ends with a call to the
WRITE_HANDLE procedure to write out
the data statement just created. The pro-
cess is then repeated for every data state-

ment in the input file until the end of the
source file is reached, at which time both
the source file and the .BAS file are closed
using DOS function 3Eh (Close File Han-
dle). After setting AL to the appropriate re-
turn code, the program is then terminated
by function 4Ch.

In addition to its usefulness in making it
easier to exchange binary files with others,
the new version of MAKEBAS presented
here creates BASIC programs that require
less room in the magazine. Less space de-
voted to BASIC listings means more space
devoted to the useful programs and com-
mentary that are a regular part of the Pro-
ductivity section. And for those of us who
are one-finger typists, the reduced number
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typing in the utilities and more time spent
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Salvatore P. Ricciardi is a senior pro-
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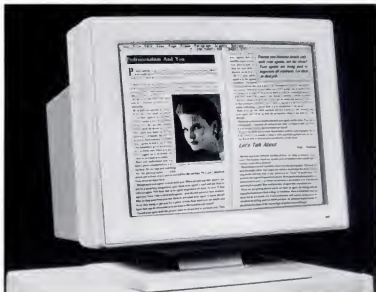
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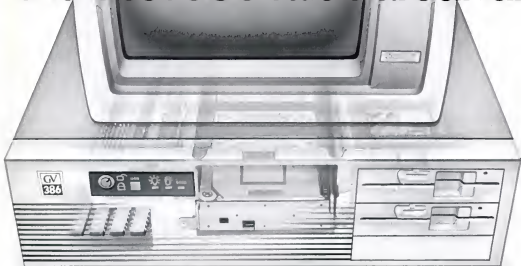
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CIRCLE 511 ON READER SERVICE CARD

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■ ENVIRONMENTS ■ CHARLES PETZOLD

PRESENTATION MANAGER DIALOG PROCEDURES



The concluding discussion of the BOXES program explains the Presentation Manager dialog box procedure and reflects on message architecture versus top-down programming.

Beginning with the July 1988 issue of *PC Magazine*, I've been describing a simple OS/2 Presentation Manager program that draws a series of nested boxes in its client window. The first version of the program (BOXES1) simply drew the boxes and showed how a Presentation Manager application can alter its output based on the size of its window.

The Presentation Manager is an interactive environment, so the second version (BOXES2) was enhanced to include a menu through which you could change the foreground and background colors. Menu logic is built into the Presentation Manager; so in order to use a menu, BOXES2 didn't have to do much but define a menu template and await messages from the menu window.

In some cases—as when a program requires the user to enter a numeric value, for example—a menu is inadequate. A program can then use a dialog box. A dialog box is a window that itself contains several control windows (which often include static text fields and one or more buttons). BOXES3 has two dialog boxes. The first is a simple "About" box that describes the program. The second dialog box allows the user to specify the number of boxes the program draws and an increment value used in spacing them.

In the previous Environments column, I discussed the BOXES3.RC resource script file and the BOXES3.H header file. With these two files plus the BOXES3 make file shown in Figure 1, the BOXES3.C source code file shown in Figure 2, and the BOXES3.DEF module definition

file presented in Figure 3, you can create BOXES3.EXE by running

```
MAKE BOXES3
```

To do this you will also need various utilities (such as the RC.EXE resource compiler and the header files tools) that were shipped in April to subscribers of the Microsoft OS/2 Software Development Kit. When the Presentation Manager is introduced, lower-cost program development kits should become available.

As you'll recall from my column in the previous issue, the BOXES3.RC resource script file contained templates for the two dialog boxes. Now let's examine the changes to BOXES3.C necessary to display these two dialog boxes and process messages from them.

CLIENTWNDPROC ADDITIONS

As in BOXES1.C and BOXES2.C, the bulk of BOXES3.C is devoted to ClientWndProc. This window procedure

handles messages to the program's client window. Adding two dialog boxes to BOXES3 requires very little change in ClientWndProc. All we need is some code to invoke the dialog boxes when a user selects the "About Boxes3 . . ." and "Number and Increment . . ." items from the menu.

When the user selects a menu option, the menu window sends the client window a WM_COMMAND message. The cmd field that accompanies this message contains the menu item ID. For these two menu items, the IDs are IDM_ABOUT and IDM_NUMINC (which are defined in BOXES3.H).

When ClientWndProc receives a WM_COMMAND message with an IDM_ABOUT or IDM_NUMINC cmd field, it calls the Presentation Manager function WinDlgBox. This function displays a dialog box. The WinDlgBox function does not return until the dialog box is destroyed, which usually happens when

```
#-----
# BOXES3 make file
#-----

boxes3.obj : boxes3.c boxes3.h
cl -c -G2w -W3 -Zp boxes3.c

boxes3.res : boxes3.rc boxes3.h
rc -r boxes3

boxes3.exe : boxes3.obj boxes3.def boxes3.res
link boxes3, /align:16, NUL, os2, boxes3
rc boxes3.res
```

Figure 1: The BOXES3 make file.

■ ENVIRONMENTS

you press an "OK" or "Cancel" button in the dialog box window. (The Presentation Manager "destroys" a dialog box by removing it from the screen and freeing all resources connected with it.)

Here's the call to WinDlgBox when ClientWndProc receives a WM_COMMAND message with the cmd field set to IDM_ABOUT:

```
WinDlgBox (HWND DESKTOP, hwnd,
           AboutDlgProc, NULL,
           IDD_ABOUTBOX, NULL) ;
```

The fifth parameter to WinDlgBox (the identifier IDD_ABOUTBOX) tells the Presentation Manager which dialog box template to use. This identifier is defined in BOXES3.H and was used in BOXES3.RC to identify the dialog box template for the "About" box.

The third parameter (AboutDlgProc) is the address of the AboutDlgProc function

in BOXES3.C source code. This is the function that processes messages to the dialog box window.

WinDlgBox does a lot of work. It must access the dialog box template (which is stored as a resource in the program's .EXE file) and create the main dialog box window. WinDlgBox also creates a number of child windows within the dialog box window. In this case, the child windows are four static text strings and one button labeled "OK."

THE ABOUT BOX PROCEDURE Just as the program's client window has a window procedure named `ClientWndProc`, the "About" dialog box has a dialog window procedure named `AboutDlgProc`. As you can see, `AboutDlgProc` is structured just like a window procedure. The four parameters to `AboutDlgProc` are identical to the parameters to `ClientWndProc`. One

significant difference is that AboutDlgProc calls WinDefDlgProc rather than WinDefWindowProc for the default processing of messages it chooses to ignore.

AboutDlgProc doesn't really receive all messages to the main dialog box window. Instead, it shares the processing of messages with a window procedure inside the Presentation Manager that is dedicated to dialog box message processing. In fact, AboutDlgProc is so lazy that it processes only WM_COMMAND messages.

As we've seen previously, a menu sends WM_COMMAND messages when a user selects an option from the menu. A button (such as the one in the dialog box) also uses WM_COMMAND messages to indicate when the button has been "pushed."

When you click the button marked "OK" with the mouse, it sends a WM_COMMAND message to its owner.

```

DEEBC3.3 -- C#3.0 program that draws nested boxes in client window
(c) 1998, Riff Communications Company
PC Magazine ~ Charles Petzold, 5/88
*/

#define INCL_WX
#include <wx2.h>
#include <wxdef.h>
#include "wxmac3.h"

SHORT numBoxes = 50 ; /* number of boxes to draw [initially] */
SHORT increment = 20 ; /* rotate each 1/8th of a circle [initially] */

METHOD1 EXTERNAL ClientWindowProc (HWND, UMSGRET, WPARAM, LPARAM) ;
METHOD2 EXTERNAL AboutDialogProc (HWND, UMSGRET, WPARAM, LPARAM) ;
METHOD3 EXTERNAL EndDialogProc (HWND, UMSGRET, WPARAM, LPARAM) ;

/*
 *
 */
int main (void)
{
    static CHAR szClientTitle[] = "Boxes" ;

    HWND hWin ;
    HWND hBox ;
    HWND hwndFrame, hwndClient ;
    MSG msg ;

    hWin = WinMain(0, 0, 0, 0) ;
    hwnd = WinCreate(hwndFrame, hBox, 0) ;

    WinRegisterClass(
        hBox, /* Another block handle
                * Name of class being registered
                * Client window proc
                * Window procedure for class
                * Class type
                * Extra bytes to reserve
                */
        szClientTitle,
        ClientWindowProc,
        CD_SIZEHIDDEN,
        0) ;

    hwndFrame = WinCreate(hwndWin,
        SW_SHOWDEFAULT, /* Parent window handle
                        * style of frame window
                        */
        sz_Visible,
        CD_SIZEHIDDEN,
        PW_TITLEBAR,
        PW_CWDEFAULT,
        PW_MINMAX,
        PW_MENU,
        szClientTitle, /* Client window class name
                        * Title bar text
                        */
        sz_Visible, /* style of client window
                        * Window handle for resources
                        * ID of resources
                        */
        sz_Visible, /* Pointer to client window handle
                        */
        0) ;

    while (WinMessage(hBox, hwndFrame, hwnd, 0))
        WinDispatch(hBox, hwndFrame) ;

    WinDestroyWindow(hwndFrame) ;
    WinDestroyResources(hwnd) ;
    WinMainEnd(hBox) ;

    return 0 ;

}

/*
 *
 */
Client window procedures

```

[illegible]

Figure 2: The *BOXES3.C* source code file.

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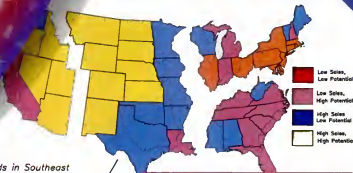
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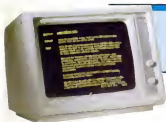
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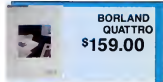
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ing of the successive boxes. NumIncDlgProc also has two buttons labeled "OK" and "Cancel."

The WM_INITDLG message is the first message that a dialog box procedure receives. During this message the function can perform necessary initialization of the dialog box before it is displayed. NumIncDlgBox first sends the two text-entry field windows an EM_SETTEXTLIMIT message. This message is understood only by text-entry-field windows; it limits the number of characters that the user can type in the field. In this case, we're limiting the field to two digits.

The WinSetDlgItemShort function sets the contents of the two text-entry fields to initial values. These values are obtained from the global variables usNumBoxes and usIncment. These variables are also used in ClientWndProc while drawing the boxes during processing of the WM_PAINT message.

Once the dialog box is displayed, the user can use the Tab key to navigate around the dialog box and enter new values in the text-entry fields. All this logic is handled within the Presentation Manager. NumIncDlgBox does nothing else until the user is ready to terminate the dialog box by pressing either the "OK" or the "Cancel" button.

TERMINATING THE DIALOG BOX

A user can terminate this second dialog box in several ways, using either the keyboard or the mouse. The user essentially says one of two things: "OK—Use the new values that I've entered to draw the boxes" or "Cancel—Forget about what I've done and just make the dialog box go away."

A user selects "OK" in one of three ways: by clicking the "OK" button with the mouse, by pressing the Spacebar when

the "OK" button has the input focus, or by pressing the Enter key when the "OK" button (or no button) has the input focus. A user selects "Cancel" by clicking the "Cancel" button with the mouse, by pressing the Spacebar or Enter key when

■ Simply calling the WinDismissDlg function causes the dialog box to be destroyed.

the "Cancel" button has the input focus, or by pressing the Esc key.

When the user selects "OK," NumIncDlgBox receives a WM_COMMAND message with a cmd field of DID_OK. For "Cancel" the cmd field is DID_CANCEL. Handling the WM_COMMAND message for DID_CANCEL is easy: NumIncDlgBox simply calls the WinDismissDlg function. This causes the dialog box to be destroyed.

When the cmd field of the WM_COMMAND message is DID_OK, NumIncDlgProc first calls the WinQueryDlgItemShort function to obtain the two new values in the text-entry fields and store them in the local variables usLocalNumBoxes and usLocalIncrement. The WinQueryDlgItemShort returns a 0 if the text-entry field does not contain a pure numeric value. The program also checks that usLocalNumBoxes and usLocalIncrement are greater than 0.

If there are problems with the numbers, NumIncDlgProc displays a message box by calling WinMessageBox. The message box is a very simple form of a dialog box

```

;-----
; BOXES3.DEF module definition file
;-----

NAME DESCRIPTION BOXES3
PROTHODE 'Draws boxes in client window (c) 1988, ziff communications co.
WEAPIS 1824
STACKSIE 8192
EXPORTS ClientWndProc
AboutDlgProc
NumIncDlgProc
  
```

Figure 3: The BOXES3.DEF module definition file.

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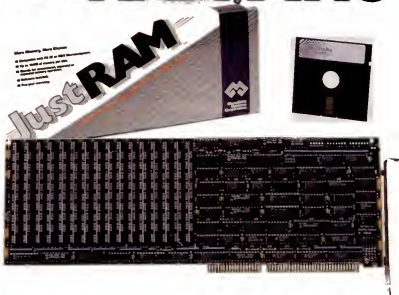
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that usually contains a message and one or more buttons.

If the new values are valid, then NumIncDlgProc sets the global variables usNumBoxes and usIncIncrement to usLocalNumBoxes and usLocalIncrement, respectively. It then calls WinDismissDlg to destroy the dialog box.

Note that the second parameter to WinDismissDlg is set to TRUE (the value 1) if the user selects "OK" and to FALSE (the value 0) if the user selects "Cancel." The value of this WinDismissDlg parameter is returned from the WinDlgBox function called from ClientWndProc.

Thus, if the user selects "OK," WinDlgBox returns 1 and ClientWndProc calls WinInvalidateRect. This invalidates the client window and causes the Presentation Manager to send ClientWndProc a WM_PAINT message. ClientWndProc then repaints the window using the new values of usNumBoxes and usIncIncrement. If the user selects "Cancel," WinDlgBox returns 0 and ClientWndProc does nothing more.

This is the most convenient way of getting very simple information from a dialog box procedure back to the client window procedure.

A NEW MODULE DEFINITION FILE
Presentation Manager programs usually require a module definition file with the extension .DEF. The module definition file for BOXES3 is shown in Figure 3.

The EXPORTS section of BOXES3.DEF has been expanded from that used in BOXES1.DEF and BOXES2.DEF. The earlier module definition files listed only ClientWndProc as an exported function. BOXES3.DEF adds AboutDlgProc and NumIncDlgProc to the list. Every window procedure, including those used for dialog boxes, must be exported.

What does it mean for a function to be "exported"? Very simply, it means that the function can be called from outside the program. All functions in dynamic link libraries that are called from applications (or other dynamic link libraries) must be exported. Window procedures are similar because they are called from Presentation Manager dynamic link libraries.

When a function in one module (be it a program or a dynamic link library) is

called by another program or dynamic link library, the value of the data segment register (DS) is initially that of the module calling the function rather than that of the module that contains the function. There-

fore, the value of DS must be saved on the stack and DS must be set to the data segment of the module containing the function. At the end of the function, DS must be popped from the stack.



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When you export a function, you are simply telling OS/2 to add this special code to the beginning and end of the function.

CONVOLUTED AND CONFUSING?

In this series of four Environments columns, I've attempted to describe some aspects of programming for the OS/2 Presen-

■ It takes time to see the elegance and logic hiding behind the surface complexity of PM.

tation Manager. Without a doubt, one's first encounter with message-based architectures is difficult. It is like stepping off a bus in a town where the streets are circular rather than straight, where directions are meaningless, and where everyone speaks an undecipherable language.

This is a normal reaction. It's commonly estimated that a programmer must spend about 6 months with a message-based architecture (such as *Microsoft Windows* or the Presentation Manager) before he becomes accustomed to it and is able to work within the architecture.

As more people start looking at the Presentation Manager in the months ahead, you may hear DOS programmers and "industry observers" complain that the architecture of the Presentation Manager is hopelessly convoluted and confusing. But that's surely a hasty and superficial evaluation. (If it were true, there would be no software at all for the Apple Macintosh or for *Microsoft Windows*!) It takes time to see the elegance and logic hiding behind the surface complexity.

I think you'll find that the initial struggle involved in learning how to program for the Presentation Manager will pay off. There will come a time when you'll see that message-based architecture is a worthy and powerful successor to the more common and familiar top-down architectures of traditional environments. Then you'll be prepared to meet the programming challenges of the 1990s head-on. □



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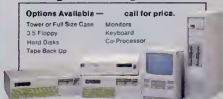
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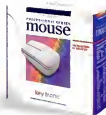
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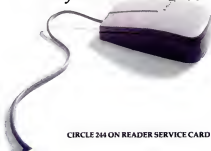
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MASM PROGRAMMING FOR QUICKSORT



Now that we have examined and implemented the Quicksort in C, here's an example using the same algorithm to sort integers in an assembly language program.

In the previous issue I took a brief look at the Quicksort algorithm, and implemented it simply in C and in an example program that called the general-purpose C library routine `qsort` to sort strings. In this issue I'll get a little more serious and implement a simple Quicksort in assembly language!

As you'll recall, Quicksort was invented in 1960 by C. A. R. Hoare, one of the few computer-science academicians who don't just farm everything out as graduate student projects. Quicksort is widely used because it performs well on all kinds of data (although some other sorting algorithms are faster on certain types of data sets), because it has been studied closely and so is well understood, and because it lends itself well to implementation in languages that support recursion.

Quicksort is a member of the "divide and conquer" school of sorting algorithms. It functions by successively partitioning the data set into smaller pieces, then calling itself recursively to sort the pieces. At low enough levels, the pieces simply become two-member sets that can be "sorted" by exchanging them if necessary.

Figure 1 shows a pseudo-Pascal implementation of Quicksort for integer arrays, which I have adapted from Robert Sedgewick's book *Algorithms* (2nd Edition, p. 118). This is a dandy book for reading about sort techniques, not only because it is very clearly written, but also because it has marvelous illustrations. For the 2nd Edition, Sedgewick implemented a simulator that both runs the Pascal ver-

```

procedure quicksort(left,right:integer);
var t,i,j:integer;
begin
  if right>left then
  begin
    v:=a[right]; i:=left-1; j:=right;
    repeat
      repeat i:=i+1 until items[i]>=v;
      repeat j:=j-1 until items[j]<=v;
      t:=items[i];
      items[i]:=items[j];
      items[j]:=t;
    until j<=i;
    items[j]:=items[i];
    items[i]:=items[j];
    items[right]:=v;
    quicksort(left,i-1);
    quicksort(i+1,right)
  end
end;

```

Figure 1: An integer Quicksort coded in pseudo-Pascal.

```

void quicksort(int left, int right)
{
  int i, j, t; /* some scratch variables */
  if(right > left) /* skip unnecessary calls */
  {
    i = left-1; j = right; /* initialize scan pointers */
    /* partition array on value */
    /* of the rightmost item */
    do {
      /* scan right for item >= */
      /* than partitioning value */
      do i++;
      while(items[i] < items[right]);
      /* scan left for item <= */
      /* than partitioning value */
      do j--;
    } while(i < j);
  }
}

```

(continues)

Figure 2: QSORT.C, integer Quicksort in C, parallel to the Pascal listing in Figure 1.

■ POWER PROGRAMMING

```

while(items[j] > items[right] && j > 0);

t = items[i];          /* interchange the items */
items[i] = items[j];
items[j] = t;

} while(j > i);         /* do until pointers cross */

items[j] = items[i];   /* undo the last swap and */
items[i] = items[right]; /* put the partitioning */
items[right] = t;       /* element into position */

quicksort(left, i-1);   /* sort items to left of */
                        /* partitioning element */

quicksort(i+1, right);  /* sort items to right of */
                        /* partitioning element */
}

```

(Figure 2 ends)

sions of the algorithms and directly generates graphics that demonstrate what is going on within the data. These graphics bring home the actual operation of a sorting algorithm in a way that text and

pseudocode can never match.

A C implementation of the integer array Quicksort is presented in Figure 2. This listing exactly parallels the Pascal version in Figure 1, but readers of this C- and

MASM-oriented column may find it easier to follow. Note that the C code is intrinsically recursive because it uses automatic variables, which are allocated on the stack when a routine is entered.

INTEGER QUICKSORT IN MASM

The source listing QSORTI.ASM, shown in Figure 3, is in turn a direct MASM rendering of the C code in Figure 2. It is called with the addresses of the first and last members of an array of 16-bit signed integers, and it returns after sorting the array with all registers unchanged. I have commented the MASM source code by including analogous statements that I've taken from the C version, so you can use the C listing as a sort of high-level road map for the MASM routine.

The QSORTI routine forgoes certain optimizations both to keep the code read-

```

name      qsorti
title     QSORTI.ASM Integer Quicksort
page      55,132

;
; QSORTI.ASM --- Integer Quicksort
;
; Copyright 1988, Siff Communications Co.
; PC Magazine * Ray Duncan
;
; Call with: DS:SI = address of first item to sort
;            DI:DI = address of last item to sort
;            Assumes items are 2-byte integers
;
; Returns:   Nothing, all registers unchanged.

itemsiz equ 2          ; bytes per integer

_TEXT segment public 'CODE'
        assume cs:_TEXT,ds:NOTHING,es:NOTHING

left equ [bp-8]         ; stack variables
right equ [bp-4]        ; first item to sort
                        ; last item to sort

public qsorti           ; make visible to linker

qsorti proc near
        cmp di,si        ; if right <= left
        jna qsort5        ; just exit

        push bp           ; set up stack frame
        mov bp,sp         ; and local variables
        push es           ; offset last item
        push di
        push ds           ; offset first item
        push si
        push cx
        push bx
        push ax

        sub si,itemsiz    ; si = i = left - 1
        mov bx,di         ; DI = j = right
                        ; jk = right

qsort1: ; partition array so
        ; value of rightmost item

qsort2: ; scan right for item
        ; >= partitioning value

        add si,itemsiz    ; i++
        mov ax,[si]       ; while(items[i] < items[right])

```

```

        cmp [bx],ax       ; guaranteed to terminate
        jlt qsort2        ; when i = right)

qsort3: ; scan left for item
        ; <= partitioning value
        sub di,itemsiz    ; j--

        cmp di,left       ; while(items[j] > items[right]
        jna qsort4        ; && (j > left)

        cmp ax,[bx]
        jg qsort3

qsort4: mov ax,[di]       ; exchange the items
        xchg ax,[si]
        mov [di],ax

        cmp di,si         ; while(j > i)
        jle qsort1        ; (do until pointers cross)

        mov ax,[di]       ; undo the last exchange
        xchg ax,[si]
        mov [di],ax

        mov ax,[bx]       ; put the partitioning
        xchg ax,[si]       ; element into position
        mov [bx],ax

        push si           ; save i

        mov di,si         ; qsort(left, i-1)
        sub di,itemsiz
        mov si,left
        call qsorti

        pop si            ; qsort(i+1, right)
        add si,itemsiz
        mov di,right
        call qsorti

        pop ax            ; restore registers,
        pop bx            ; discard stack frame
        pop cx
        pop dx
        pop si
        pop di
        pop bp

qsort5: ret               ; return to caller

qsorti endp
_TEXT ends
end

```

Figure 3: QSORTI.ASM, integer Quicksort in MASM, parallel to the listings in Figures 1 and 2.

able and because I will be generalizing the routine to sort items of any size and type (like the C library routine `qsort`) in an upcoming column. This is why I did not use the CMPSW instructions to scan forward and backward in the array, for example. Further, QSORT1 saves all registers and sets up a stack frame, neither of which is strictly necessary in this version, but which will provide the underpinnings for the later, more general version of the procedure.

When you are reading or changing the code in QSORT1, pay careful attention to comparisons followed by conditional branches. You must be sure to use the "unsigned" conditional jumps (such as JA and JB) when comparing addresses, and the "signed" conditional jumps (such as JG and JL) when comparing values. Using the wrong type of jump in the wrong place can manifest itself in the form of very nasty and elusive bugs—the kind that are dependent on address sizes, and thus on the order of statements in your source code or even on the order in which modules are linked.

One particular sequence in the

■ Using the wrong type of jump in the wrong place can manifest itself in the form of nasty and elusive bugs—the kind dependent on address sizes.

QSORT1 source code that you might find curious, if you are optimization-minded, is the set of six instructions

```
mov ax,[di]
xchg ax,[si]
mov [di],ax
mov ax,[bx]
xchg ax,[si]
mov [bx],ax
```

Upon reading this sequence, your immedi-

ate instinct will be to replace it with

```
mov ax,[si]
xchg ax,[di]
xchg ax,[bx]
mov [si],ax
```

I encourage you to try it. You'll find that Quicksort immediately stops working! Why? It's because when QSORT1 recurses and calls itself with pointers to an array that contains only two elements, two of the three index registers are (naturally) pointing to the same element and the three-way swap of values does not work as expected. Your mission, should you choose to accept it, is to find the less-intuitive sequence of operations that works for all cases and is still more efficient than the original six-instruction sequence.

MASM QUICKSORT DEMO The TRYQSI.ASM program shown in Figure 4 provides an interactive demonstration of the QSORT1.ASM routine. It prompts you to enter from 1 to 25 numbers, converts the ASCII numbers to binary, and puts the val-

<pre>name tryqsi title TRYQSI Demo of Integer Quicksort page \$5,132 ; ; TRYQSI.ASM Demonstration of Integer Quicksort ; ; Copyright 1988, Riff Communications Co. ; PC Magazine © Ray Duncan ; atdin equ 8 ; standard input handle atdout equ 1 ; standard output handle atderr equ 2 ; standard error handle cr equ \$dh ; ASCII carriage return lf equ \$ah ; ASCII line feed _TEXT segment word public 'CODE' assume cs:_TEXT,ds:_DATA extrn itoa:near extrn atoi:near extrn qsort1:near main proc near mov ax,_DATA ; make our data segment mov ds,ax ; addressable... mov es,ax main1: ; begin entry of data mov word ptr ixi,\$; initialize array index mov dx,offset msg1 ; display "Enter Numbers" mov cx,msg1 len mov bx,atdout ; BX = handle mov ah,4bh ; Fan 4Bh = write mov int ; transfer to MS-DOS mov dx,offset msg3 ; display item number mov cx,msg3 len mov bx,atdout ; BX = handle mov ah,4bh ; Fan 4Bh = write mov int ; transfer to MS-DOS cmp ax,2 ; was anything entered? je main3 ; empty line, exit mov si,offset ibuff ; convert input to call atoi ; binary in reg. AX mov bx,ixi ; put data into array shl bx,1 ; (item number - 2) [bx+items],ax inc word ptr ixi ; count items stored cmp word ptr ixi,25 ; force maximum = 25 jne main2 ; get another entry main3: ; empty line entered... mov word ptr ixi,\$; any data in array? cmp word ptr ixi,0 je main5 ; no, just exit</pre>	<pre>main2: ; convert item number ; to ASCII string... ; 1-based item number mov ax,ixi inc ax mov bx,offset msg3a ; address for string call h2asc ; convert it mov dx,offset msg3 ; display item number mov cx,msg3 len mov bx,atdout ; BX = handle mov ah,4bh ; Fan 4Bh = write mov int ; transfer to MS-DOS mov dx,offset ibuff ; DS:BX = input buffer mov cx,66 ; CX = max input length mov bx,atdin ; BX = handle mov ah,3fh ; Fan 3Fh = read mov int ; transfer to MS-DOS cmp ax,2 ; was anything entered? je main3 ; empty line, exit mov si,offset ibuff ; convert input to call atoi ; binary in reg. AX mov bx,ixi ; put data into array shl bx,1 ; (item number - 2) [bx+items],ax inc word ptr ixi ; count items stored cmp word ptr ixi,25 ; force maximum = 25 jne main2 ; get another entry main3: ; empty line entered... mov word ptr ixi,\$; any data in array? cmp word ptr ixi,0 je main5 ; no, just exit</pre>
---	---

(continues)

Figure 4: TRYQSI.ASM, an interactive demonstration of the integer Quicksort routine QSORT1.

■ POWER PROGRAMMING

```

mov     si,offset items ; otherwise sort data...
mov     di,ix1          ; DS:SI = first item
dec     di              ; DS:DI = last item
shl     di,1
add     call qsorti     ; call QuickSort
; display sorted data...

mov     word ptr ix2,0 ; initialize array index
; display "Here are the
; sorted numbers..."
mov     dx,offset msg2  ; DS:DX = message address
mov     cx,msg2 len     ; CX = message length
mov     bx,stdout       ; BX = handle
mov     ah,40h          ; Fxn 40H = write
int     21h            ; transfer to MS-DOS

main4:  ; display next item...
; convert item number
; to ASCII string
mov     ax,ix2          ; i-based item number
inc     ax
mov     bx,offset msg3a ; address for string
call    b2dec           ; convert it
; display item number
mov     dx,offset msg3  ; DS:DX = message address
mov     cx,msg1 len     ; CX = message length
mov     bx,stdout       ; BX = handle
mov     ah,40h          ; Fxn 40H = write
int     21h            ; transfer to MS-DOS

mov     bx,ix2          ; calc. array offset
shl     bx,1
mov     ax,[bx*items]   ; get data from array
; convert data to ASCII
mov     cx,10           ; use base 10
mov     si,offset nbuff ; address for string
call    itoa            ; convert it
; display converted data...
mov     cx,ax           ; CX = string length
mov     dx,si           ; DS:DX = string address
mov     bx,stdout       ; BX = handle
mov     ah,40h          ; Fxn 40H = write
int     21h            ; transfer to MS-DOS

inc     word ptr ix2    ; advance through array

mov     ax,ix2          ; done with array yet?
cmp     ax,ix1
jne     main4           ; no, display another

jmp     main1           ; restart user entry

main5:  mov     ax,4c00h ; final exit to MS-DOS
int     21h
main    endp

b2dec  proc  near
; convert binary value 0-99
; to decimal ASCII chars.
; call with
; AL = binary data
; BX = addr. for 2 chars.
; divide AL by 10, leaving
; AH=quotient, AL=remainder
; convert to ASCII
; store ten's digit
; store one's digit
; return to caller
    mov     ax,00h
    add     ax,00h
    mov     [bx],ah
    mov     [bx+1],al
    ret
b2dec  endp

_TEXT  ends

_DATA  segment word public 'DATA'
msg1   db  cr,lf,lf
        db  'Enter numbers to sort...'
msg1_len equ $-msg1
msg2   db  cr,lf
        db  'Here are the sorted numbers...'
msg2_len equ $-msg2
msg3   db  cr,lf,'Item '
msg3a  db  'XX'
msg3_len equ $-msg3
ibuff  db  99 dup (?) ; keyboard input buffer
obuf   db  99 dup (?) ; output conversion buffer
items  dw  25 dup (0) ; holds numbers to sort
ix1    dw  0          ; number of array items
ix2    dw  0          ; array output pointer

_DATA  ends
STACK  segment para stack 'STACK'
        db  128 dup (?)
STACK  ends
end     main

```

(Figure 4 ends)

ues into an array. After you enter several numbers, when you press Enter alone TRYQSI will sort the array and then print the sorted values. Either hit Enter by itself at the "Item 01:" prompt or press Ctrl-C or Ctrl-Break at any time to terminate the demo.

In order to use TRYQSI, you will need the following source files:

TRYQSI.ASM (this issue)
 QSORT1.ASM (this issue)
 ATOI.ASM (February 16, 1988)
 ITOA.ASM (February 29, 1988)

```

atoi.obj : atoi.asm
masm /Zi atoi;

itoa.obj : itoa.asm
masm /Zi itoa;

qsorti.obj : qsorti.asm
masm /Zi qsorti;

tryqsi.obj : tryqsi.asm
masm /Zi tryqsi;

tryqsi.exe : tryqsi.obj atoi.obj itoa.obj qsorti.obj
link /CO tryqsi+qsorti+atoi+itoa;

```

The latter two procedures convert ASCII **Figure 5: A MAKE file to build TRYQSI.EXE.**

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■ POWER PROGRAMMING

strings to 16-bit integers and back. To build the executable file TRYQSI.EXE, enter the following commands:

```
MASH TRYQSI;  
MASH QSORTI;  
MASH ATOI;  
MASH ITOA;  
LINK TRYQSI+QSORTI+ATOI+ITOA;
```

You can also automate the process of building TRYQSI.EXE with a MAKE file, such as the one shown in Figure 5. In an upcoming column we'll turn TRYQSI into an interactive test-bed for our more general QSORT program.

You can learn a lot about the operation of Quicksort and gain a deeper understanding of the algorithm if you assemble all of the modules with the /Zi switch, link TRYQSORT.EXE with the /CODEVIEW

■ Run the program under the *CodeView* debugger and you can see each line of the source code as the machine executes it.

switch, and then run the program under the control of the *CodeView* debugger. This will let you see each line of the source code as the machine executes it and monitor the contents of the registers and the depth of recursion. You can also set a "watch-point" on the array being sorted and see the data moving around. If nothing else, it will help you while away a few hours until the next issue of *PC Magazine* arrives!

Algorithms, Robert Sedgewick, 2nd Edition, 1988; Addison-Wesley Publishing Co., Jacob Way, Reading, MA 01867; (617) 944-3700.

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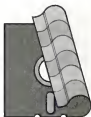
The bottom line is that Symphony is one high performance package that's made to be opened up.



Lotus Symphony 2.0

■ DOUGLAS COBB AND STEVEN COBB

SPREADSHEET CLINIC



Easily changing setup strings for a LaserJet; a macro that alerts you when 1-2-3 finishes recalculating; displaying a full screen list of range names in 1-2-3.

A simple way to have 1-2-3 alert you when it's through with a long recalculation job

Here's a simple way to make 1-2-3 sound an alarm when it finishes recalculating a worksheet. After pressing the Calc key, just press the Edit key immediately, followed by the Right key (one or more times), and finally Esc.

Since the extra keystrokes are made while 1-2-3 is in the process of recalculating the worksheet, they're initially stored in the keyboard buffer. When the recalc finishes, however, they're processed next. The Edit keystroke brings the entry in the current cell to the Edit line and positions the cursor at the end of that entry. Since the cursor is already at the end, the Right keystrokes you entered can't move the cursor, and each will produce a beep. The final keystroke, Esc, clears the entry from the Edit line and returns 1-2-3 to the Ready mode.—Don Anselm; Lake St. Louis, Missouri

Like many 1-2-3 users, we've often pressed the Calc key on a large worksheet, turned to do something else, and forgotten about the worksheet until long after 1-2-3 had finished recalculating it. This clever technique will alert you to completion of a recalculation, as long as you remain within earshot of your computer.

Some users may find it more convenient to program this into a simple macro, such as the one shown in Figure 1. The macro will work in all releases of 1-2-3,

	A	B	C	D	E	F
1	\r	{Calc}	{Edit}			
2		{Right}	{Right}	{Right}	{Right}	{Right}
3		{Esc}				
4						

Figure 1: This macro recalculates the current worksheet and sounds an alarm when the recalculation is complete.

	A	B	C	D	E
1	OFF	{Let POS,@CELLPOINTER("address")}			
2		{Goto}MESSAGE			
3		{Indicate "BUSY"}			
4		{WindowsOff}{PanelOff}			
5		{Goto}{POS}			
6					
7	POS				
8					
9	ON	{Indicate}{WindowsOn}{PanelOn}			
10					

Figure 2: These macro routines provide useful alternatives to including {WindowsOff}, {PanelOff}, {WindowsOn}, and {PanelOn} commands directly in a macro.

but if you have Release 2.0 or later you can replace the five {Right} commands with the command {Right 5}.

How to prevent unwary users from rebooting when you freeze the screen to speed up a macro

The {WindowsOff} and {PanelOff} commands speed macro execution by preventing 1-2-3 from redrawing the screen after it executes each command in the macro. When an unfamiliar user sees a frozen screen, however, he may incorrectly assume that his computer has locked up and

that he should reboot it.

You can avoid this problem by using a call to the OFF subroutine, shown in Figure 2, which creates an on-screen message before invoking the {WindowsOff} and {PanelOff} commands. These commands are not entered directly into the macros. The first step in the subroutine enters the current cell pointer address into the cell named POS (B7). The second command moves the cell pointer to the cell named MESSAGE and positions that cell at the upper-left corner of the screen. MESSAGE should be in a remote section of the worksheet. One of the cells near center screen when MESSAGE is in the upper-

■ SPREADSHEET CLINIC

left corner should contain a message such as "1-2-3 is executing a macro. Please wait. . ."

The third command in this subroutine places the word **BUSY** in the mode indicator. The fourth and fifth commands freeze the screen while the message area of the worksheet and the custom mode indicator are visible. The final command moves the cell pointer back to the cell whose address is stored in **POS**—the cell upon which the cell pointer was positioned when the subroutine was called.

In a similar way, rather than put {WindowsOn} and {PanelOn} directly into your macros, call the subroutine named **On**. The first command in this subroutine, {Indicate}, clears the custom message from the mode indicator. The next commands, {WindowsOn} and {PanelOn}, unfreeze the screen.—*Chris Ruckman; Germantown, Maryland*

In many macro situations, this technique is preferable to simply freezing the screen. However, if the macro takes a long time to execute, an inexperienced user may think his computer has locked up, even with an explanatory message on the screen.

Still another good approach that returns you to your starting place in a worksheet

In previous issues of Spreadsheet Clinic, you've demonstrated a number of ways to browse a remote portion of a worksheet and then return the cell pointer to its original position. You've also shown a pair of macros that save the current position of the cell pointer and then return the cell pointer to that cell at a later point in time.

These techniques and macros work well. However, when I need to return the cell pointer to its original position after browsing the worksheet or making an entry into a remote cell, I prefer the macro routine shown in Figure 3. The initial commands freeze the screen. Next come three commands that assign the range name **MARK** to the cell over which the cell pointer is positioned at the time. The first of these ensures a range named **MARK** exists before the next command deletes it. After the second of these commands clears

the range name **MARK**, the third one assigns that name to the current cell.

The next command in the macro tells 1-2-3 to display the mode indicator **MARK**, after which the screen is unfrozen. The {?} command allows the user to move around the worksheet, make entries, and so forth. As soon as the user presses Enter, however, the macro regains control. It freezes the Control Panel and returns the cell pointer to its original position—the cell named **MARK**. Then it deletes the range name **MARK** and returns the mode indicator to its normal function.—*John Eckenrode; St. Paul, Minnesota*

The use of the /Range Name Create command to name the current cell is an alternative to using a

```
{Let X, @CELLPOINTER("address")}
```

command to store the address of that cell. You may, however, wish to use an {OnError} command in place of the first /mc sequence, as shown in Figure 4. If a range

	A	B	C	D
1	\1	{WindowsOff}{PanelOff}		
2		/rnmk		
3		/rnmk		
4		/rnmk		
5		{Indicate MARK}		
6		{WindowsOn}{PanelOn}		
7		{?}		
8		{PanelOff}		
9		{Goto}MARK		
10		/rnmk		
11		{Indicate}{PanelOn}		
12				

Figure 3: This macro routine returns the cell pointer to its original position after you browse the worksheet or make an entry into a remote cell.

	A	B	C	D
1	\1	{WindowsOff}{PanelOff}		
2		{OnError CONTINUE}		
3		/rnmk		
4		{OnError}		
5		/rnmk		
6		{Indicate MARK}		
7		{WindowsOn}{PanelOn}		
8		{?}		
9		{PanelOff}		
10		{Goto}MARK		
11		/rnmk		
12		{Indicate}{PanelOn}		
13				

Figure 4: You may wish to use an {OnError} command in place of the first /rnmk command in the macro shown in Figure 3.

named **MARK** does not exist when 1-2-3 executes the /md command in cell B3, it will route the execution of the macro to the /mc command in cell B5. The null {OnError} command in cell B4 ensures that the error trap will apply only to the /md command.

One additional note: since 1-2-3 automatically unfreezes the screen when it ends the execution of a macro, there's no reason to end this macro (or any others, for that matter) with a {PanelOff} and/or {WindowOff} command.

Simplifying the task of changing LaserJet setup strings for printing worksheets

When printing a worksheet, you must select either landscape or portrait orientation, various numbers of characters per inch on each line, and various numbers of lines on each page, depending on the size of the worksheet. Manually changing from one printing configuration to another requires a lot of keystrokes for the HP LaserJet. It also requires you to remember HP's confusing setup strings.

To avoid these difficulties, I created the macros shown in Figure 5 and stored them in a worksheet named **PRINT**. After creating a new worksheet, but before printing it, I use the /File Combine Copy Entire-File **PRINT.WK1** command to combine these macros into it. Next, I use /Range Name Labels Right to assign the names \a, \b, \c, \d, \e, \f, and \g to them. I can then set the desired printing configuration simply by invoking the appropriate macro.

Each of these macros basically works in the same way. First, it issues the /Print Printer Options Setup command, types the character *, and presses Enter, assuring that the setup string for the worksheet contains at least one character. Second, the macro reissues the Setup command, presses Esc to clear the current setup string, and types the setup string that commands the LaserJet to print in a particular configuration. Third, it allows you to specify the left margin, and fourth, the appropriate page length. Finally, each macro returns you to the Ready mode.

Thus, each macro in the worksheet specifies a different combination of page

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■ SPREADSHEET CLINIC

	A	B	C	D	E	F	G	H
1	\a	/ppos*"(a(c)@27E\@27a110\@27k2S"ml(?)^p45"qq						
2								
3	\b	/ppos*"(a(c)@27E\@27a110e2S.647c66F\@27k2S"ml(?)^p66"qq						
4	\c	/ppos*"(a(c)@27E\@27a110"ml(?)^p45"qq						
5	\d	/ppos*"(a(c)@27E\@27a110e2S.647c66F"ml(?)^p66"qq						
6	\e	/ppos*"(a(c)@27E\@27k2S"ml(?)^p66"qq						
7								
8	\f	/ppos*"(a(c)@27E\@27a12e5.647c89F\@27k2S"ml(?)^p89"qq						
9	\g	/ppos*"(a(c)@27E\@27a114c1e7.64c66F"ml(?)^p66"qq						
10								
11	[Alt]a	Landscape, 176 columns, 45 lines per page						
12	[Alt]b	Landscape, 176 columns, 66 lines per page						
13	[Alt]c	Landscape, 186 columns, 45 lines per page						
14	[Alt]d	Landscape, 186 columns, 66 lines per page						
15	[Alt]e	Portrait, 132 columns, 66 lines per page						
16	[Alt]f	Portrait, 132 columns, 89 lines per page						
17	[Alt]g	Portrait, 80 columns, 66 lines per page						
18								
19								
20								
21								
22								

Figure 5: These macros automate the process of setting different print configurations for an HP LaserJet and can be modified for use in other spreadsheets.

orientation, characters per line, and lines per page. For example, the macro named \a specifies Landscape orientation, 176 characters per line, and 45 lines per page; macro \e specifies Portrait orientation, 132 characters per line, and 60 lines per page; and so forth.—David R. Sharp, Salt Lake City, Utah

This macro will save a lot of time for 1-2-3 users who print on an HP LaserJet. Of course, you can modify these macros for use in *Symphony*, *Quattro*, and *SuperCalc*. Unlike 1-2-3, *Symphony* can read the range names from a file when you combine information from that file into a worksheet. Consequently, there's no need to name the macros after you combine them into *Symphony*.

Displaying a full-screen list of range names in 1-2-3

In Spreadsheet Clinic (March 10, 1987) you published an undocumented 1-2-3 feature: if you press the Name key (F3) after issuing the /File Retrieve command, 1-2-3 displays a full-page list of the worksheet files in the current directory.

This same technique can be used with the Goto key. As most users know, if you press Name after you press Goto (F5), 1-2-3 will display a one-line listing of the range names in the current worksheet.

What most users don't know is that if you then press Name again, 1-2-3 will display a full-screen list of the range names. You can move the cursor to any of the names in the list and press Enter, and 1-2-3 will move the cell pointer to that range. As far as I can tell, this Name-Name feature is also undocumented.—Paul H. Meijer; Charlestown, Massachusetts

In Release 2 of 1-2-3, the function of the Name key has been expanded to include some of the power of the Menu key in *Symphony*. In all releases of *Symphony*, pressing Menu after issuing the /File Retrieve command will display a full-screen list of filenames. Likewise, pressing Menu twice after pressing Goto in *Symphony* displays a full-screen list of range names.

Both of these features are extremely useful. We're glad Lotus decided to include them in 1-2-3—even though it decided not to document them.

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■ EDITED BY SALVATORE P. RICCIARDI



USER-TO-USER

Send hex codes to any DOS character device with this handy utility; finding a string in multiple sets of files by using the DOS FIND command in a batch file.

A fast and easy way to send hex codes to any DOS character device

One of the things I like about having a multifunction printer is that I can customize it for various applications by sending it a series of printer control codes. The difficulty with this is that there is no easy and efficient way to send printer control codes from DOS.

In my present setup I often have to adjust the printer configuration to reset the printer, set the top of form, or clear the print modes. I used to send printer codes to the printer by setting up the sequences in a text file using a byte-level disk file editor, and then sending it to the printer using the command

```
COPY CODES.TXT PRN
```

However, it was difficult to enter codes (such as Esc) from the keyboard, and the text files were hard to change. In addition, since DOS allocates disk space in cluster-size blocks, I found that I had eaten up 25,000 bytes of disk space putting in a dozen sequences!

My solution is SENDCODE. This small COM program will take as many two-digit hexadecimal codes as can fit on the DOS command line and send them to the standard output device. Using the DOS redirection facility, the codes can be sent to the printer. To enter the codes, just type SENDCODE followed by the hex digits to be sent (upper- or lowercase). The codes can be separated by a space or a comma for easier reading, but they do not need to be.

SENDCODE only looks for the digits 0 to 9 and the letters A to F; any other characters are ignored. The program will process the line, two digits at a time, starting with the first character, following the command up to the carriage return. If there is an odd number of digits, the last digit before the carriage return is ignored.—Mike S. O'Donnell, Worthington, Ohio

Mr. O'Donnell's original submission was written to send codes directly to the printer, but he suggested the code be modified to use the standard output device. I incorporated his suggestion, along with some other minor adjustments, in the debug script shown in Figure 1. To create SENDCODE.COM, type in the SENDCODE.SCR DEBUG script exactly as shown using a pure-ASCII text editor. Be sure to include a blank line—just hit the Enter key—above the RCX command. And be sure to press the Enter key at the end of each line, especially the last (with the Q).

Then make sure DEBUG is in your current directory or in a directory accessed by your PATH command, and type

```
DEBUG < SENDCODE.SCR
```

This will create the file SENDCODE.COM.

The SENDCODE program is particularly useful because it can be used to send codes to any character device driver recognized by DOS. Every DOS system includes components of the operating system software known as *device drivers*. A device driver is a program that provides an interface between DOS and your peripheral

```
N SENDCODE.COM
A
MOV     BX,81
MOV     CL,04
XOR     DL,DL
MOV     AL,[BX]
CMP     AL,0D
JE       0138
CMP     AL,30
JB       0135
CMP     AL,39
JBE      0121
AND     AL,DF
CMP     AL,41
JB       0135
CMP     AL,46
JA       0135
SUB     AL,07
SUB     AL,30
ROL     AL,CL
ADD     DL,AL
CMP     CL,00
JNE      132
MOV     AH,02
INT     21
XOR     DL,DL
XOR     CL,04
INC     BX
JMP      107
MOV     AX,4C00
INT     21

RCX
3D
W
Q
```

Figure 1: Listing of SENDCODE.SCR, a debug script that creates SENDCODE.COM, a program to send hexadecimal codes to any DOS character device.

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■ USER-TO-USER

al devices, such as a printer or hard disk. The driver relieves DOS from the burden of having to deal with the specifics of a particular device. Instead, a standard interface is defined between DOS and the driver. The device driver itself deals with the hardware specifics.

There are two kinds of device drivers: character and block. A character driver interfaces with a peripheral that takes input and output one character at a time, such as the console or a printer. A block device driver, on the other hand, transfers data in chunks instead of one character at a time. A good example of a block device is a hard disk.

Every character device has a logical name (one to eight characters) that can be used by an application to communicate with the device driver. The table shown in

Standard MS-DOS Character Devices

Device name	Description
CON	Keyboard and display
PRN	Printer—list device
AUX	Auxiliary (usually serial port)
CLOCK\$	System real-time clock
NUL	NUL device

Additional MS-DOS Character Devices Supported by Most Systems

Device name	Description
COM1	Serial communications port 1
COM2	Serial communications port 2
COM3*	Serial communications port 3
COM4*	Serial communications port 4
LPT1	Printer port 1
LPT2	Printer port 2
LPT3	Printer port 3

* COM3 and COM4 support was added to DOS starting with Version 3.3

Figure 2: These character device drivers are standard in all versions of MS-DOS. The additional drivers are supported on most PC-DOS-compatible systems.

Figure 2 lists the five character devices that are supported on all systems. In addition, most DOS implementations also support seven additional character devices. These are listed in the table in Figure 2. SENDCODE's output can be routed to a device by appending the DOS redirection symbol (>) to the end of the command followed by the logical name of the device.

SENDCODE can be used, for example, to send printer codes to any of the possible printer devices—LPT1 (also known as PRN), LPT2, and LPT3. In order to send a formfeed to the printer attached to LPT1, use SENDCODE 0C > LPT1. To send a reset sequence to an HP LaserJet Series II attached to the third printer port, use SENDCODE 1B 45 > LPT3.

If you have loaded the ANSI.SYS device driver (by including the line DEVICE=ANSI.SYS in your CONFIG.SYS file), you can use SENDCODE to send ANSI escape sequences to the console device. To clear the screen and home the cursor using ANSI, use SENDCODE 1B 5B 32 4A. To set the screen colors to a yellow foreground on a blue background, use SENDCODE 1B 5B 33 33 3B 34 34 6D. Note that since the default standard output device is the console, no redirection is needed.

The DOS redirection facility makes it easy to use SENDCODE to create a file of escape sequences. For example, you can create a file called HP.SET that contains a complete series of printer commands, and then copy it to the printer all at once using the DOS copy command. To create such a file, first use the following command to enter the first series of codes (substituting the hex codes for your printer in place of the xx's):

```
SENDCODE XX XX XX XX XX [...] > HP.SET
```

Then, repeat this next command as many times as necessary to append all of the remaining codes:

```
SENDCODE XX XX XX XX XX [...] >> HP.SET
```

The additional greater-than sign informs DOS that data should be appended to the existing file. Finally, once the file is created, use the following command to send it to the printer:

```
COPY HP.SET PRN /B
```

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■ USER-TO-USER

The /B command option is used to indicate that the file should be copied exactly as is, with no special processing for control characters such as the "Z end-of-file indicator.—Salvatore P. Ricciardi

Productivity Tip

A batch file can be created to automate the process of adding subdirectories to the end of your path. The following example batch file, **ADDPATH.BAT**, will add each of its parameters to the end of the current path.

```
:LOOPSTART
IF (%1)==() GOTO DONE
PATH=%PATH%;%1
SHIFT
GOTO LOOPSTART
:DONE
PATH
```

—Salvatore P. Ricciardi

Locating a string in multiple file sets using batch

I frequently need to locate a string within all files having a common extension. The use of the DOS FIND command was my first attempt at meeting this need, but FIND does not support wildcards.

For my second attempt I used the DOS FOR command with FIND from the DOS prompt, as in the following example:

```
FOR %I IN (*.PRG) DO FIND/N "foo" %I
```

Being the efficient person that I am, I placed the command in a batch file named **FND.BAT**, passing the filename with wildcards as parameter %1 and the string to be located as a parameter %2.

This works if the string to be located does not contain any blanks. However, if the string does contain blanks, only the portion of the string up to the first blank is

passed. This causes the FIND command to terminate with a syntax error since the closing double quote is missing. Back to the drawing board.

Finally, I found a solution that works for strings that contain blanks. Within a loop I append %2 to an environment variable and perform a SHIFT. This is continued until %2 is empty, at which time the loop is exited. Then I use the environment variable as the string to be located by FIND. The batch commands that implement this algorithm follow:

```
:LOOP
SET STR=%STR% %2
SHIFT
IF NOT "%2" == "" GOTO LOOP
FOR %I IN (%1) DO FIND/N %STR %I
SET STR=
```

There is a minor problem with this solution, however. The FOR command allows a blank separated list of file specifications to appear within the parentheses. But only one filename, with or without wildcards, is

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■ USER-TO-USER

allowed by the above commands. Multiple filenames could be allowed if parameters were accumulated into one environment variable as filenames until a separating pa-

rameter was recognized. Then parameters could be accumulated into another environment variable as the string to be located until the command line was exhausted of

all parameters. The batch file FND.BAT, shown in Figure 3, implements this algorithm. The slash character (/) is used to delimit the file names from the string to be located.—Douglas Heathcoat; Rhode-Saint-Genese, Belgium

```

ECHO OFF
REM FND.BAT

:FM_LOOP
SET FM=FM%* %1
SHIFT
IF NOT "%1" == "/" IF NOT "%1" == "" GOTO FM_LOOP
IF NOT "%1" == "/" GOTO MISSING_DEL

:STR_LOOP
SET STR=STR%* %2
SHIFT
IF NOT "%2" == "" GOTO STR_LOOP

FOR %%1 IN (%FM%) DO FIND /N /STR %STR %%1
GOTO EXIT

:MISSING_DEL
ECHO Missing / delimiter between file names and string to be located.
ECHO Usage: FND filespec filespec [...] /"string string"
ECHO Example: FND *.ASH *.8 /"prog1"

:EXIT
SET FM=
SET STR=

```

Figure 3: FND.BAT, a batch file that automates finding a string in multiple sets of files.

To use the batch file FND.BAT as shown in Figure 3, you must have the DOS FIND command either in your current working directory or in a directory listed in your path statement. Be sure to include the double quotes surrounding the string, or the FIND command will issue an error message.

The use of a loop to incrementally build an environment variable is a neat technique, and one which can be especially useful whenever you wish to vary the number of parameters in a command. In this instance, the varying items are the number of file specifications and the number of blank delimited strings.

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Each time through the loop, the SET statement appends the value of %1 to the end of the environment variable, along with a preceding space. The SHIFT command causes %1 to take on each of the parameter values in turn. When %1 contains the "end the loop" value, the loop ends. To help illustrate how this works, try running the batch file shown in Figure 4. It creates an environment variable called EXAMPLE and appends each command

```
ECHO OFF
REM EXAMPLE.BAT
:EXLOOP
SET EXAMPLE=%EXAMPLE% %1
ECHO EXAMPLE=%EXAMPLE%
SHIFT
IF NOT (%1) == () GOTO EXLOOP
SET EXAMPLE=
```

Figure 4: EXAMPLE.BAT, a batch file that illustrates the use of a loop to incrementally build an environment variable.

line parameter to it, displaying its value each time through the loop.

So, for instance, if you execute the command EXAMPLE 1 2 3 4 5 6, the output will look like

```
C:\>ECHO OFF
EXAMPLE= 1
EXAMPLE= 1 2
EXAMPLE= 1 2 3
EXAMPLE= 1 2 3 4
EXAMPLE= 1 2 3 4 5
EXAMPLE= 1 2 3 4 5 6
```

Removing the temporary environment variables used in FND.BAT is a good programming practice as well, the idea being that the environment should be restored to its condition prior to running the batch file. The two commands SET STR= and SET FN= remove STR and FN from the environment, thereby restoring the environment to its condition prior to running the batch file.—Salvatore P. Ricciardi

Productivity Tip

In the AUTOEXEC.BAT file, include a command that sets the prompt to display the drive and directory; for example, PROMPT \$P. This is useful because no matter where you are in the directory structure, you can always find out what the current directory is by looking at the prompt. —Neil J. Rubenking

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CIRCLE 297 ON READER SERVICE CARD

■ EDITED BY CRAIG L. STARK

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Achieving uniform printouts by using explicit defaults in WordPerfect

Since the defaults in other users' copies of WordPerfect often vary, documents may format and print out differently on their computers. Default settings do not automatically get embedded into the individual documents.

You could go around the office and install all copies of WordPerfect with the same defaults, but you'd also have to ensure that everyone had the same printer model. Or you could bring your own WordPerfect diskette to the other computer—if you're willing to forego the benefits of hard-disk operation and want to carry around the drivers for all the printers that you might use on your disk.

A much less cumbersome method is to make the defaults explicit by embedding the format commands directly into documents. At the beginning of each document, I run a macro that sets pitch, font, margins, etc. Some settings, such as Justification and Widow/Orphan protection, require more care. To get Justification OFF, I first set it ON, and then OFF twice. Widow/Orphan is similar. These commands do not generate codes if the option you enter is the same as the default.

A couple of potential problems remain. You can't control the backup setting from within your document, so don't depend on backups on another machine. And if the printer has more than one driver available (a laser with two cartridges, for example),

you must select the desired printer from Select Print Options.—*Daniel L. Milkove; Arlington, Virginia*

Take this advice if you share documents or work on other people's computers. When your format settings are explicit, different defaults can't surprise you.

The sample macro JUSTOFF below inserts a [Rt Just Off] code in your text regardless of your defaults.

```
<ctrl>-F10>      Begin macro definition
<ctrl>-F10>      Call it "JUSTOFF"
<ctrl>-F10>      Print Format, Just. On, then OFF
<F7>             Exit Print Format
<ctrl>-F10>      End macro definition
```

If justification OFF is your default, you'll have an ON code before the OFF, which you can delete.—*Neil J. Rubenking*

Producing underlined reports that read like fanfold paper printouts

A report with all records underlined but with the headings, date, page number, margins, and totals printed normally is often easier to read. You can create this effect using dBASE III's Report Form generator by defining the contents of the first column as the printer control code to activate underlining, and the contents of the last column as the code to deactivate underlining. With my HP LaserJet, column I contains CHR(27) + ' + &d@'; the last column contains CHR(27) + ' + &d@'. An IBM ProPrinter would use the codes CHR(27) + CHR(45) + CHR(1) for on and CHR(27) + CHR(45) + CHR(1) for off.—*Mary Focht; Harrison, Ohio*

This technique is especially useful for wide reports you print in landscape mode on a laser printer, as the underline helps to guide your eye across the page. It's a less viable option on a dot matrix printer, since it slows down printing considerably.

Perhaps a slightly better technique, available to dBASE III Plus users, is to underline every third entry for legibility. For the HP LaserJet this involves defining the contents of column I as

```
IIF(RECH(1)/3=INT(RECH(1)/3),CHR(27)+"&d@", "")
```

Note, however, that this alternative will work correctly only on a nonindexed file.

—*Brad Stark*

Finding and changing WordPerfect's soft return codes

I needed to manipulate WordPerfect's soft return ([SR]) in reveal codes mode) to prevent the insertion of some unwanted line feeds. The manual was no help, but I finally discovered that in the search-and-replace modes a Ctrl-M produces the [SR] character, so I can now manipulate the soft returns as needed.—*Bob M. Gassaway; Albuquerque, New Mexico*

Do note that although you can replace the soft returns with something else, you can't simply eliminate them. If you search for [SR] codes and replace them with nothing, WordPerfect will immediately restore the soft returns when it reformats.

I use the macro shown in Figure 1 to soften up documents that have a hard re-

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```
<Ctrl-F10>
SOFTENUP<CR>
<Home><Home><Up>
<Alt-F2>N
<CR><CR><F2>
<Alt>159<F2>
<Home><Home><Up>
<Alt-F2>N
<CR><F2>
<Ctrl-H><F2>
<Home><Home><Up>
<Alt-F2>N
<Alt>159<F2>
<CR><CR><F2>
<Ctrl-F10>
```

Begin macro definition
Call it SOFTENUP
Get to the top
Find and replace w/o confirm
Find double hard returns...
... and replace with character 159
Get to the top
Find and replace w/o confirm
Find each remaining hard return...
... and replace with soft return
Get to the top
Find and replace w/o confirm
Find character 159...
... and replace with two hard returns
End macro definition

Figure 1: A WordPerfect macro that replaces line-ending hard returns with soft returns but keeps two hard returns between paragraphs.

```
DE BC ES 1XC *SX01,-1**SX02,*CF**LBSTART* SX01,*PV01*+1*BC
SE /+PV06/*XC *IF*ER**TRUE*GLEND*E1*GLSTART*LBEND*BC JMP *PV02*XC
DO BC ES 9XC BC *PV01* occurrences*EX1*
```

Figure 2: Except for line length, COUNT.PGM is shown above exactly as it will appear on your screen in "expanded" display mode. The program should be entered as a single string, and XyWrite will automatically add a single space after each of the functions that show up in bold. Note that the boldface is produced by XyWrite's programming mode, not by entering these letters in Mode Bold.

turn at the end of every line. It preserves the double hard return at the end of paragraphs but replaces all others with soft returns. The macro works in three stages. First it locates every double hard return and replaces it with a special placeholder character—I happen to use ASCII character 159. Then it replaces all hard returns with soft returns. Finally, it restores all the placeholder characters to two hard returns. Note that in order to enter character 159, you must hold down the Alt key, tap 1,5,9 on the numeric keypad, and then release Alt.—Neil J. Rubenking

Counting the occurrences of characters or strings in XyWrite

One notable omission from XyWrite's otherwise full list of features is the ability to count the occurrences of a character or string in your text. The short program COUNT.PGM shown in Figure 2, which you enter using its built-in programming facility, will remedy this deficiency.

The first two commands blank the display during the search and turn off the annoying message beep. Save/Get 01 is a

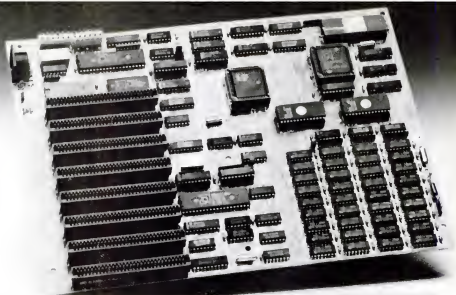
variable initialized to -1; a second Save/Get remembers the cursor position in the text, from which the search will begin. The search string, enclosed by the conventional " " delimiters, uses the default Save/Get 00 to record whatever appears on the command line after the command itself—that is, your search string. As the program searches for the string, it loops back to the start label and increments Save/Get 01 with each hit. When no hits are found, ER==TRUE becomes true, and execution branches to the end label, prints the number of occurrences on the command line, returns the cursor to its starting point, and reenables the display and message beep.

To use COUNT.PGM, simply go to XyWrite's command line and enter

RUN COUNT.PGM string

where *string* is the character(s) or phrase you want to count.—C. E. L. Stark; Montclair, New Jersey

In addition to its general use, programmers will find the COUNT.PGM program handy for verifying that they have the same number of open and closed parentheses,



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curly brackets, and the like.

You can avoid having to enter the Run command each time by assigning the whole program to a Save/Get key. On the command line just enter

```
LDPM COUNT.PGM,X
```

where *x* is the letter or number you want to use to run the program. You then only have to type your search string on the command line and hit Alt-*x*.

Owners of *XyWrite III Plus* can avoid the need to enter the program in its somewhat cumbersome "programming mode" by opening up a normal file, switching into "expanded" mode (Ctrl-F9), and then entering all the boldface programming functions by using the new PFUN command. In "expanded" mode you use Ctrl-, and Ctrl-. to enter the < and > characters.—Craig L. Stark

Productivity Tip

When printing *dBASE* labels, aligning the left column is always a problem when a prefix field exists in some records but not in others. The solution involves padding all the columns with a space. Assuming field names of PRE, FN, LN, STR, CITY, ST, and ZIP, set up the LABEL FORM columns thus:

```
(" +pre)-(" +fn)-(" +ln)
(" +str)
(" +city)-(" +st+ " +zip)
```

—Brad Stark

The pros and cons of using SuperKey to create recursive macros in Microsoft Word

Microsoft Word won't allow a macro to call on itself, and you can't trick the program by using two macros that call on each other. Sometimes, however, only by letting a macro call on itself will you save enough keystrokes to make the macro worth bothering with.

In such cases it's worth using an external macro program like *SuperKey*. Suppose you want to create a numbered list with a hanging indent, for example. You can use the Esc Format Paragraph command in *Word* to set the indent to one inch,

and the first line to -0.5 inch. You can then create the following <Alt> macro in *SuperKey*:

```
<F10> <F10> <TAB><F10><F10><ENTER><ALT>
```

This macro lets you enter a number, hit Return, type the item for the list, hit Return, then start again. (When you finish the list, you hit Ctrl-Esc to break out of the macro.) The savings of two keystrokes for each item on the list add up, though only on a long list. If you used *Word*'s macro feature, there would be no saving at all, since you would have to invoke the macro for each item on the list.—Mike Pandolfo; Maspeth, New York

The *SuperKey* macro is easier to create, since you can use the learn mode to create it. But *Word* offers a more sophisticated way to get the same result. *Word* lets you repeat a given macro any number of times by using the Repeat . . . Endrepeat command. The format is

```
<Repeat N[commands to repeat] <Endrepeat>
```

where *N* is the number of times you want the commands repeated. If you want to type a list with 100 items, you can create the following macro:

```
<Repeat 100 <space> <tab> <space> <enter> <Endrepeat>
```

If you want a general-purpose macro for creating lists, you can treat the number of repeats as a variable and use the Ask command to set it:

```
<ask <Repeat> How many items will be in this list <repeat <space> <tab> <space> <enter> <endrepeat>
```

Further, in a general-purpose macro, don't overlook the possibility of using the macro to set the paragraph format.—M. David Stone

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LANGUAGES

A C program that searches for keywords in Microsoft Word files; a simple method in Turbo Pascal that stores configuration information internally; how numbers are stored in BASIC.

How BASIC stores numbers and numeric variables

Several readers have been puzzled when writing a program in IBM BASIC that involves numbers larger than 32767. Entering `A=999999`, for example, and listing the program shows the number changed to 999999!, with the added exclamation point. Before I explain why an exclamation point is always appended to large numbers, it is important to understand how numbers and numeric variables are stored by BASIC internally. When you enter a program statement such as `X=132`, BASIC first converts the ASCII characters into a corresponding integer value before adding the statement into the program. In this case, 132 is represented by a byte with the value 132, followed by a second byte with a value of zero.

Regardless of the number of digits that make up the number, integers are always kept in 2 bytes. Larger numbers are stored with the second byte holding the number of "256s" and the first byte holding the remainder. Thus, the number 258 would be represented as a 2 followed by a 1 ($2 + 1 \times 256$), and the value 512 is stored as a 0 followed by a 2 ($0 + 2 \times 256$).

Of course, numbers could be kept in their ASCII form, but they would have to be converted before any calculations could be performed. This is the approach Microsoft used with some of its earlier BASIC interpreters, such as the one included with the Apple II computer. Since the conversion from ASCII takes time, the designers

of BASIC realized that it would be more expedient to convert the number at the time it is entered, rather than when the program runs. Further, if a program line is executed more than once, this eliminates having to perform the same conversion repeatedly.

In a similar fashion, BASIC also converts its keywords to a special "tokenized" form to save time when the program is run. For example, if you enter a BASIC command such as `PRINT` or `INPUT` in a program, BASIC stores them as single bytes (145 and 133, respectively). Besides saving time, this also results in a smaller program file on disk. But because BASIC keywords are tokenized, they must be converted back to their original form when you list your program. This is why keywords are always displayed in uppercase—BASIC has no way to know how they were originally entered.

Single-precision values are always stored in 4 bytes, regardless of how many digits the number contains. Double-precision variables and numbers each require 8 bytes. Unless you specify otherwise, BASIC considers all numeric variables to be single-precision values, which brings up an important point—the "type declaration" character.

If you want to tell BASIC that a particular variable is to be double-precision, you would add a pound sign (#) after the variable's name. Integers are declared with a percent sign, and single-precision variables use the exclamation point. When BASIC sees a statement such as `X=43`, it realizes that the 43 can be kept as an integer and allocates 2 bytes to hold it within

the program. But if you were to enter `X=43.0`, BASIC would instead set aside 4 bytes and convert the number to a single-precision value. Then when the program is listed, an exclamation point will be printed to indicate the precision. Therefore, BASIC is actually doing you a favor by displaying not only the number but also its precision.

The only question that remains is why you would want to establish the precision for a numeric constant. Higher precisions can be used for variables to accommodate very large or small values, or when the accuracy of a calculation must be valid to many digits. But what does this have to do with constants?

One instance when it's important to be aware of a constant's precision is when the value is simply too large to be stored as an integer. Another is when a double-precision variable is to be assigned from an initial value that must also be very accurate. For example, if you run this short program, the resulting value of `Z#` will be more accurate than the variable `Y#`:

```
10 FOR X% = 1 TO 10000
20   Y# = Y# + 1.1
30   Z# = Z# + 1.1#
40 NEXT
50 PRINT Y#, Z#
```

Yet another good reason to indicate the precision of a numeric constant is to make a program run faster. Each time BASIC needs to add or multiply values whose precisions are different, it must first convert one of them to the precision of the other, which takes time. Finally, `FOR/NEXT`




```

+oct;
if (ct == MAXFILES)
    break;
}
follows(ptr);
finfo["B"];
/*reset to NULL*/
/*end of FOR loop*/
}
fseek(buffer);
return(ct);
}

/* display_fileinfo()
Prints information on each file that contains the string.
*/
display_fileinfo(int numfound, char *string)
{
    int i;

    printf("Add file contains '%s'\n",
        numfound, (numfound == 1 ? "a" : "s"), (numfound == 1 ? "a" : "s"),
        string);
    for (i = 0; i < numfound; ++i)
        printf("File %d bytes %02d-%02d-%02d %02d-%02d-%02d\n",
            fdata[i].fnum,
            fdata[i].fsize,
            fdata[i].fmon,
            fdata[i].fday,
            fdata[i].fyear,
            fdata[i].fhour,
            fdata[i].fmin,
            fdata[i].fsec);
}

/* compare()
Reads the contents of the file pointed to by ptr. (Up to false bytes)
Updates the buffer, to match any case.
Searches for the string.
Returns non-zero value if found.
Otherwise, returns 0.
*/
char *compare(FILE *ptr, char *buffer, const char *string, int fsize)
{
    char *ffind["B"];
    unsigned int numread;
    const char *hold;
    numread=fread((char *)buffer, sizeof(char), fsize, ptr);
    if (numread)
    {
        buffer[numread] = NULL;
        hold = strtok(buffer, " ");
        ffind = strtok(hold, string);
        return(ffind);
    }
}

```

(Figure 1 ends)

instead of the following:

```

fsearch(string)
const char *string;

```

Now that ANSI C is a reality, you'll begin to see the former used much more.

There is a minor weakness in this program, however. The files are read into the buffer in BUFSIZE chunks. If the string to be found extends across the buffer (that is, part of it comes in with one chunk and the rest with another), `fsearch()` won't find it. This will only happen on files bigger than 30K (the current setting for BUFSIZE).—Richard Hale Shaw

Productivity Tip

If you use a custom library within the QuickBASIC Version 4.0 environment and create an .EXE program, QuickBASIC foolishly adds the entire contents of that library to your program. The LINK program can include only the needed routines, but apparently the QuickBASIC compiler isn't smart enough to tell it to do so. The solution is to always compile and link manually from DOS.

Techniques for writing self-modifying programming in Turbo Pascal

Many application programs use some form of configuration file to store internal information so they can retrieve it at a future session. For example, *Microsoft Word*

stores such information in a file called `MW.INI`. Certain other programs such as Borland's *SideKick* store it within their own compiled program files.

When writing standalone applications in Turbo Pascal, it is sometimes useful to be able to use this latter technique. The

Pascal program `SELFMOD.PAS` (shown in Figure 2) shows how simply you can do this. Note that you must not rename the program—the name of the .COM file must be identical to the name coded into the typed constant, `ProgramName`. Also, you must run the program from within its own

```

PROGRAM Self_Modify;
{ Compile to a .COM file before execution }

CONST
    StoredValue : STRING[88] = 'initial value of stored string';
    ProgramName : STRING[64] = 'SELFMOD.COM';

VAR
    F : FILE OF Byte;
    I : Integer;

BEGIN
    Assign(F, ProgramName);
    ({SI-} Reset(F); {SI+}
    IF IOResult = 0 THEN
    { check for i/o error }
        BEGIN
            ({SI-} Seek(F, OfS(StoredValue)-$100);
            ({SI+}
            { get location of StoredValue }
            IF IOResult <> 0 THEN
            { (e typed constant) in Cseg }
                BEGIN
                    WriteLn('Seek failed.');

```

Figure 2: The program listing for `SELFMOD.PAS`. A demonstration of how to have a program modify its own typed constants to store configuration information internally.

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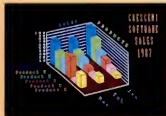
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subdirectory (as opposed to running it by means of a PATH).

With PC/MS-DOS Version 3.x, it is possible to overcome this limitation by obtaining the full pathname of the executing program from its environment. (See Turbo Power User, *PC Magazine*, June 9, 1987.)—C. Ravindra Weerasinghe; Nugoda, Sri Lanka

This is strictly a TP3 technique—it works only on .COM files. But given that limitation, it does work well. If you combine this tip with the earlier ones that let you locate the exact pathname under which your program was called, you'll have a powerful method for reconfiguring your programs.—Neil J. Rubenking

Productivity Tip

The best method I know to make any BASIC program run faster is to always start it with the statement `DEFINT A-Z`. When used in a FOR/NEXT loop, the default single-precision variable type is *much* slower than an integer. Further, integers are more than adequate for most programming situations, and they require only 2 bytes for storage rather than 4.

Productivity Tip

When you use the Turbo Pascal 4.0 EXEC command to execute another program, be sure to use the SM compiler option to minimize stack-and-heap usage. The absolute minimum is {\$M 1024, 0, 0}. That gives you 1K stack and no heap. Your program will probably need more than this, but keep your usage as low as possible.

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■ ROBERT L. HUMMEL

PC TUTOR

An explanation of the DOS program DEBUG.COM and a tutorial of how this valuable tool can be used with PC Magazine's DEBUG script files.



A step-by-step tutorial for working with PC Magazine DEBUG scripts

Just like the legendary snack Cracker Jack, each box of DOS has a free gift hidden inside. Unfortunately, this is generally unknown and therefore ignored by most computer users. But included on one of the distribution disks packaged with each copy of DOS is a valuable tool that, used wisely, can greatly enhance the operation and enjoyment of your PC. I'm talking, of course, about the DEBUG program.

Well, perhaps not every one of you shares my enthusiasm. After all, if you're not an assembly code programmer, DEBUG (pronounced DEE-bug) may seem like the last thing you'd ever want to be involved with. Working with DEBUG is often very confusing for PC users of all skill levels: the command syntax is cryptic and terse, and the instructions themselves are unfamiliar and share nothing in common with any popular programs. Add the use of mnemonic assembly code instructions and hexadecimal arithmetic, and you've got quite a few reasons to avoid DEBUG altogether. But, in this column, I hope to convince even confirmed DEBUG-phobes that working with DEBUG can be easy, rewarding, and even a little fun.

WHERE IS IT? If you can't locate a copy of DEBUG.COM on your hard disk, don't despair. Chances are there's a good reason for its absence. Early versions of DOS, along with all its supporting programs, easily fit onto a single floppy disk.

Users of floppy-based systems would copy this disk as their boot disk, including the DEBUG program. When hard disk systems were installed, a single COPY *.* command was usually used to transfer all the DOS files to the hard disk. As a result, DEBUG went along for the ride.

But as DOS grew in size, the increasing number of programs were eventually split over two disks. DEBUG (along with such classics as the DONKEY.BAS program) was exiled to the disk labeled "Supplemental Programs"—a sort of oblivion for systems software. Floppy disk users often misplaced (or neglected to copy) this second disk, and hard disk users seldom installed it. If DEBUG isn't on your disk, simply locate the original copies of the DOS distribution disks and copy it to a working floppy or your hard disk.

Assuming you've located a copy, you may be wondering exactly what DEBUG does. Well, part of the fascination of DEBUG lies in its ability to do many things well. First and foremost, it is a *debugger*. This is a class of program that allows other programs to be loaded, monitored, and executed in a controlled testing environment, with the end result that the "bugs," or program defects, can be identified and removed.

DEBUG can be used to permanently change the contents of a file. When a change is intended to fix a bug or remove some type of restriction, it is usually termed a *patch*. Many readers, following simple instructions in the text, have patched programs published in the Utilities column to effect changes in screen colors

or hotkeys, for example.

Text files or .COM programs can be modified and written back to disk. Because of relocation or translation, executable files of the .EXE variety and Intel Hex files (those with a .HEX extension) cannot. To modify these, you must fool DEBUG by renaming them.

The contents of memory at any location can be displayed by the DEBUG program as a string of bytes. A byte contains 8 bits (Binary digITS). Each bit can assume one of two values: 0 or 1. A group of four bits, taken as a single unit, can represent 16 possible values, from 0 to 15. Programmers found it natural, therefore, to display an 8-bit byte as two characters, where each character represents a value from 0 to 15. This number system is called hexadecimal, or hex for short. Numbers in hex are indicated in the magazine by appending an "h" to the digits. In DEBUG, all numbers are assumed to be hex.

Bytes are displayed as two-character combinations of hex digits. Hex arithmetic simply means working in base 16. The digits from 0 through 9 are familiar enough. But after that, the letters A through F are used to represent the decimal numbers 10 through 15. Thus, adding 1h to 9h produces Ah.

The contents of memory can be data, machine instructions, or simply junk that is left over from previously running another program. If the bytes represent valid 8088 instructions, however, DEBUG can *disassemble* them. (Because the letter D was already used for the DEBUG command *Dump*, Microsoft used the letter U

■ PC TUTOR

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and called the instruction *unassemble*. Both of these forms have the same meaning and are used interchangeably.) For example, the two hex bytes of machine code CD 21 are disassembled and displayed as INT 21h. DEBUG compares the values in memory against a list of valid operand codes (opcodes) and reproduces the assembly language instruction that produced them.

DEBUG SCRIPTS While DEBUG can disassemble, it can also be used as the world's cheapest assembler. Although no serious programmer would consider using it as his primary assembler, this property of DEBUG is used extensively in *PC Magazine* Productivity columns to assemble and create small .COM file utilities. The DEBUG commands listed in the magazine (known as a DEBUG script) can be entered directly or fed to DEBUG by creating a file containing the commands and using DOS redirection.

If you have problems using our DEBUG scripts, remember: the key to success is to follow our printed instructions *exactly*. A detailed tutorial should help all readers understand and use our DEBUG scripts. It's desirable, but not mandatory, that you sit at your PC and follow the instructions as you read this column.

For our example, I'll use a short program previously printed in PC Tutor (June 14, 1988). So that you only need to have one magazine in front of you, I've reprinted the original DEBUG instructions used to create the file NUMLKOFF.COM (see Figure 1).

The first step is to make sure that the DEBUG.COM program is available. It must be either in your current directory or in a directory included in your PATH statement. Start the program by typing DEBUG at the DOS command prompt. DEBUG loads and displays a hyphen—its command prompt.

```
C>DEBUG
```

Enter the first line of the DEBUG script and press the Enter key. The N command specifies the filename that we'll be using when we write the finished program to disk. The space between the N and the filename isn't required—it's just cosmetic.

```
N NUMLKOFF.COM
A 100
POP DS
AND BY [417],DF
INT 20
```

```
RCX
8
W
Q
```

Figure 1: The NUMLKOFF.SCR file, reproduced from PC Tutor, June 14, 1988, is an example of a short DEBUG script file.

Note that the full filename and extension are specified.

```
-N NUMLKOFF.COM <Enter>
```

```
-
```

The second line of the script tells DEBUG to enter assembler mode. Valid instructions entered will be assembled and their machine code equivalents placed sequentially into successive memory locations. The parameter "100" indicates that the first instruction will be assembled into memory location 100h relative to the start of the code segment. This is the standard form for a .COM file. Enter the second line of the script and press the Enter key.

```
-A 100 <Enter>
23F1:0100
```

DEBUG responds to the command by displaying the memory address at which the assembler instruction you enter will be assembled. The first four hex digits represent the segment address. This number isn't important when assembling scripts. It is generally different for each PC and depends only on the size of programs (including DOS itself) loaded before DEBUG is executed. The second four hex digits represent the offset, which, in this case, was specified to be 100h.

Many DEBUG novices, surprised by this uncharacteristically verbose response, often press the Enter key at this point. *Don't do it!* All you have to do is continue to follow the script and enter the next line, POP DS, followed by a single press of the Enter key. DEBUG will proceed to assemble the instruction and prompt you for more instructions. Enter the next two lines

of the script in the same way.

```
23F1:0100 POP DS <Enter>
23F1:0101 AND BY [417],DF <Enter>
23F1:0106 INT 20 <Enter>
23F1:0108
```

Unless we do something to stop it, DEBUG will continue to prompt for more instructions to assemble. The next line in the script (the sixth line) has nothing on it—it's blank. To enter it, simply press the Enter key once. Entering a blank line will terminate DEBUG's assembler mode and return to the command prompt.

```
23F1:0108 <Enter>
```

NUMLKOFF is an extremely short program, and we're already done assembling it. The next step, therefore, is to write it to disk. We began this process by specifying the name of the file in the first line of the script using the N command. Now we need to specify the size of the file in bytes. When writing to disk, DEBUG looks for the file size in the CX register. The R command is used to display and change the contents of registers. Enter the next line of the script.

```
-RCX <Enter>
CX 0000
```

DEBUG first displays the register name and current value. The colon prompt is displayed to give you a chance to enter a new value if you so choose. Pressing the Enter key will leave the value unchanged. In our case, we want to set CX equal to 8, the number of bytes in the program. Type in the number 8 as indicated in the script and press Enter.

```
: 8 <Enter>
```

With the program assembled and the length set, the next task is simply to write the file to disk. This is accomplished with the W command, the next line in the script. DEBUG responds by displaying a hex number indicating the number of bytes written.

```
-W <Enter>
Writing 0008 bytes
```

Finally, you quit DEBUG and return to the DOS command prompt by typing the

letter Q and pressing the Enter key.

```
-Q <Enter>
C>
```

One final word about DEBUG scripts is required. If the commands in the script are entered into a file in pure ASCII format (not a word processor file that uses special control codes), DEBUG can be made to read its commands from the file using DOS redirection.

For example, let's say you create a file called NUMLKOFF.SCR that contains the commands shown in Figure 1. (Be sure to include the blank line after the INT 20 and to hit the Enter key after the final Q.) Type the following DOS command to feed the file to DEBUG:

```
DEBUG < NUMLKOFF.SCR
```

Whichever method you choose, you should now have a new file named NUMLKOFF.COM in your current directory and a better feeling about working with DEBUG and scripts.

Productivity Tip

Many fine books have been published that document assembly code programming for the IBM PC. My personal favorite is *Assembly Language Primer for the IBM PC & XT*, by Robert Lafore (Plume/Waite, 1984; ISBN: 0-452-25711-5). This book teaches programming as well as assembly opcodes. Simply follow the examples in the book and you'll learn how to program in assembly language without realizing it. Lafore's use of DEBUG and DOS function calls as a technique for learning is particularly effective.

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The PC Tutor solves practical problems and explains points of general interest about using your hardware and software more productively, and answers basic questions about DOS and systems in general. To see your questions answered here, drop a line to PC Tutor, *PC Magazine*, One Park Avenue, New York, NY 10016. We're sorry, but we cannot answer questions personally.

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■ CONNECTIVITY CLINIC

```

%#_ADDR:
MOV    DS,OFFSET OOPS ;display error message
MOV    AX,1
MOV    AL,PRTNTR
INT    0x07
JMP    OUT ;get out of program

; Send the hex chars to the CRT four at a time.
MOV    DS:
MOV    AX,CX
CALL    HEX4FPH
MOV    AX,BX
CALL    HEX4FPH
MOV    AX,AX
CALL    HEX4FPH

; Send the hex message to the CRT
MOV    DS,OFFSET MSGA
MOV    AL,PRTNTR
INT    0x07

; Convert the last two digits to decimal for message
MOV    AX,AX ;clear the accumulator
MOV    AL,AX ;put the last four hex into AL
AND    AL,0FFH ;but only keep last two
MOV    BL,10 ;byte divider
DIV    BL
MOV    CH,AX ;keep remainder from AL
AND    AL,"0" ;convert to ASCII
CALL    PRINTY ;quotient is AL

MOV    AL,CH ;get remainder back
AND    AL,0FFH
MOV    BL,10
DIV    BL
MOV    CH,AX ;keep remainder from AX
AND    AL,"0"
CALL    PRINTY

MOV    AL,CH ;get remainder back
AND    AL,"0"
CALL    PRINTY ; and print it

; Send the Decimal message to the CRT
MOV    DS,OFFSET MSGC
MOV    AL,PRTNTR
INT    0x07

; Set up a CRLF to the CRT
MOV    DS,OFFSET CRLF
MOV    AL,PRTNTR
INT    0x07

; Now get msg1. Leave the DOS IF ERRORLEVEL value intact
GET:
MOV    AX,MSG1
MOV    AL,MSG1
INT    0x07

; Sub-Routine
; Convert hex character in AX to ASCII
HEX4FPH:
MOV    BL,AX
MOV    CL,BL
MOV    CH,BL
AND    AL,0FFH ;mask upper 4 bits
ADD    AL,70H ;decimal adjust for addition
DAA
ADC    AL,40H
CALL    PRINTY
INC    CH
JNE    LOOP
RET

; Single character print AL=CH
PRINTY:
MOV    DL,AL
MOV    AL,PRTNTR
INT    0x07
RET

CRLF
ENDS
END Entry

```

(Figure 1 ends)

```

ECHO OFF
NEWNODE
IF ERRORLEVEL 197 GOTO OTHERS
IF ERRORLEVEL 196 GOTO COMM
IF ERRORLEVEL 33 GOTO OTHERS
IF ERRORLEVEL 32 GOTO DATAS
IF ERRORLEVEL 2 GOTO OTHERS
IF ERRORLEVEL 1 GOTO ERRORS
IF ERRORLEVEL 0 GOTO 0
:OTHERS
REM Search here if address is not 196 or 32
ECHO Returns OTHER
GOTO END
:COMM
REM This is the station we want to be a comm server

```

```

ECHO Returns 196
CONSERV
GOTO END
:DATAS
REM This is the station we want to be a database server
ECHO Returns 32
DATABASE
GOTO END
:ERRORS
ECHO Returns 1
GOTO END
:19
ECHO Returns 0
GOTO END
:END
ECHO ALL DONE

```

Figure 2: NEWNODE.BAT takes the hardware address sent as output of NEWNODE.COM and branches to a segment that calls the application.

It is often useful to provide the right instructions to let an application know on what hardware it's running. To accomplish this task, write a batch file that uses the network adapter address to call an application program with the right drivers for the monitor, printer, and other devices attached to the system.

Also, each computer on a modern network can have many functions. In addition to being a workstation, any designated computer on the network can be a gateway, database server, or print server. If you don't want to maintain a different customized AUTOEXEC.BAT file for each station on the network, create a batch file that uses the hardware address and decides what network applications to load.

Productivity Tip

A LAN's rated transmission speed doesn't matter as much as the software's design. Typical throughputs for peer-to-peer networks are 90-170 kilobits per second and 260-450 kbps for dedicated servers.

Productivity Tip

The two most commonly referenced IEEE standards for LANs are 802.3 and 802.5. IEEE 802.3 describes Ethernet (with some variations) and StarLAN. IEEE 802.5 exactly describes IBM's Token-Ring. A standard under development, 802.9 will integrate LANs and ISDN.

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3. The Seller's notice must contain a stamped self-addressed card or envelope with which you can indicate your preference. If you don't respond to this notice, the Seller may assume you agree to the delay, but must either ship or cancel your order within 30 days after the original

shipping date promised or required. A prompt refund must be made when an order is cancelled.

4. Even if you've consented to an indefinite delay, you retain the right to cancel the order at any time before the item has been shipped.
5. If you choose to cancel an order, that has been paid for by check or money order, the Seller must mail you a refund within seven business days. If you cancel an order for which you paid by credit card, the seller must credit your account within one billing cycle following receipt of your request. Store credits or vouchers in place of a refund are not acceptable.
6. In the event that the item you ordered is unavailable, the Seller may not send you substitute merchandise without your express consent.

TIPS WHEN ORDERING

When ordering by mail:

State precisely what merchandise you want, specifying details such as model, make, size, component parts, etc.;

Confirm the price and expected delivery date as stated in the ad;

Indicate whether you will accept a substitute product if the item you ordered is unavailable, and, if not, that your payment should be returned;

Don't send cash, you will have no record of payment if a problem arises, and;

Keep a copy of your order and all other correspondence with the Seller. Your records should include the company's name, address and phone number; a description of the item ordered; your cancelled check or a copy of the money order; record of the date you mailed the order; and any sales slips and shipping receipts.

When ordering by phone:

Note the time and date of your conversation and the name of the person you talk with;

Make a record of your order, the price, its promised availability and the components to be expected;

Save all correspondence associated with your order, including your cancelled check or a copy of the money order, and any written confirmation sent by the Seller.

Questions you should consider asking:

Does the advertised item come with all necessary parts and accessories? Are they from the same manufacturer?

Is it available for immediate shipping? If not, when will

it be available?

Has there been an increase in the advertised price?

What warranties does the item carry? Who provides the service?

What is the Seller's return policy?

What is the Seller's refund policy?

With whom should you correspond if there is a problem?

IF YOU HAVE PROBLEMS:

1. If you have not received your order as promised or if the item is defective, immediately notify the Seller in writing referring to your order by description, price, date, as well as by account number and order number, if available. Make sure you keep a copy of the letter.
2. If you complain by telephone, send a follow-up letter to confirm what was said.
3. If you think the merchandise is defective, reread your product instructions and your warranty carefully to be sure you don't expect features or performance the product isn't designed to give. Then contact the Seller for instructions. Don't return it to the Seller until you have been instructed to do so.
4. When returning merchandise make sure you keep the shipper's receipt or packing slip; your right to be reimbursed for postal cost is determined by store policy.
5. If you have completely discussed your problem with the Seller and are still not satisfied, write to the consumer complaint agency in the Seller's state. If you paid for the merchandise by credit card, you may have rights to withhold payment under a Federal law called the Fair Credit Billing Act.

PC Magazine's Direct Marketing Connection

For PC Products and Services

For many of you, mail order is your primary means of purchasing PC products and services.

In fact, in recent interviews with our subscribers, we learned that 70% bought PC products and services through direct marketing channels during the past year.*

You buy direct because it's convenient, because you know exactly what you want and don't need any hand-holding.



The following special section, PC Magazine's Direct Marketing Connection, is what you've been demanding. It connects you with the direct marketers who are anxious to please you. By having them all in one place, you can quickly zero in on the products you need from the vendors you want to buy through.

*Starch Study, July 1986



Designer Carry Case for Laptops: Extra pockets for portable printer, battery pack, pocket modem, manuals & software etc. Comes with handle and shoulder strap. Fits NEC EL & HD and all Toshiba Laptops (except T3500).

Only 149 With any Laptop 130

TOUCH BASE Systems World Port Pocket Standards: Both 1200 & 2400 use own battery. Operate on belt and CIGIT standards. 2400 includes AC Adapter and Carbon Copy PLUS comes w/ Comes with 25 pin female connector. For Toshiba adapter cable, add \$9.
NEC Modern 1200/2400 Int 269/339
1200/2400 159/259 With any Laptop 1200/2400 150/250

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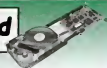


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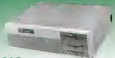
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PRODUCT CATEGORIES

HARDWARE

ADD-ON-BOARDS .369	DISKETTES ... 372, 373
CABLES 369	EXPANSION UNITS 373
COMMUNICATIONS ... 369, 370	PERIPHERALS 373, 374
COMPUTER SYSTEMS 370, 371	POWER SUPPLIES .374
DISK DRIVES .371, 372	PRINTERS 374
	SECURITY 374

SOFTWARE

ACCOUNTING 374, 375	MANUFACTURING .382
BUSINESS 375, 376	MEDICAL 382
BUSINESS PROJECT MANAGEMENT ... 376	MUSIC 382, 383
COMMUNICATIONS 376	PREVENTATIVE MAINTENANCE ... 383
CONSTRUCTION .. 376	PROGRAMMERS TOOLS 383, 384
DATA BASE 376	PUBLIC DOMAIN 384, 385
DATA ENTRY .376, 377	REAL ESTATE 385
DATA MANAGEMENT ... 377	RELIGION 385
DESKTOP PUBLISHING.. 377, 378	SALES MARKETING.. 385, 386
EDUCATION 378	SECURITY 386
ENGINEERING 378	SHAREWARE 386
ENTERTAINMENT/ GAMES 378, 379	STATISTICS .. 386, 387
FINANCIAL 379	SURVEYS 387
FLOWCHARTING .. 380	UTILITIES 387, 388, 389
GRAPHICS 380, 381	WORD PROCESSING 389
HEALTH 381	
INVENTORY 381	
MAILING PROGRAMS... 381, 382	

MISCELLANEOUS

ACCESSORIES 389	DISK CONVERSION 392
ACCOUNTING 393	DISKETTE COPY SERVICE 392
BAR CODING 389, 390, 391	NETWORKING 392
BOOKS/CATALOGUES/ PUBLICATIONS ... 391	SECURITY 392
COMPUTER INSURANCE 391	SUPPLIES 392, 393
DATA CONVERSION .391, 392	TRAINING/ TUTORIALS 393
DATA RECOVERY SERVICES 392	

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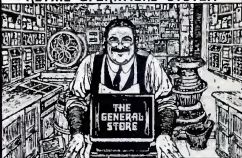
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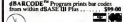
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INDEX TO ADVERTISERS

RS	ADVERTISERS	PAGE	RS	ADVERTISERS	PAGE	RS	ADVERTISERS	PAGE	RS	ADVERTISERS	PAGE
106	707 Sales	360	220	DAC Software	69	272	Kensington Microwave	172	282	Personics	18-19
267	3m Data	245	277	DAC Software	121	274	Kytronic	304-305	164	Pose Development	118-119
273	3m Data	247	484	Datamedia	346	193	Kinson Products	198	541	Polaroid	100-101
725	3m Data	273	504	Datamark Tech	216	492	Kyle International	127	209	Princeton Graphics	220
273	Adobe	330-331	352	Datamark	265	217	Larson Systems	266	344	Quard Software	344-345
242	Alpha America	190-191	340	Daybreak Technologies	187	280	LaserGo, Inc.	21	746-361	Quint Corp.	206
270	Altex Technology	133	374	Daybreak Technologies	150	341	Lifetime Memory Products	256	479	Rightsoft	76
335	American Mic	233	536	Del Computer Products	182-183	162	Logitech	322-323	290	Rose Electronics	328
475	American Small Business	284	533	Del Computer Products	180-181	151	Lotus Development	151	245	Santa Cruz Operation Inc.	72
386	Application Techniques	227	356	Deina Technologies	169	183	Lotus Development	183	385	S.C. Systems	105
477	Applied Creative Tech.	286	747	Desity Technology	270	223	Lotus Development	223	480	Seiko Instruments	108
336	Arche Technologies	195	742	Diamond Power	327	225	Lotus Development	225	496	Seiksha Corp.	306
376	Arington Computer Products	354-355	333	Digital Composition Systems	257	318	Lotus Development	318	164	Shamrock	359
324	Ashton-Tate	280-281	743	Digital Research	103	263	Macula Inc.	142	206	Silicon Specialists	22-23
471	askSam Systems	86	213	Digital Vision	328	137	Magnavox	137	64	Softline	84
186	AST Research	238-239	229	Discount Micro	250-251	224	Mannesmann Tally	131	334	Softlogic Solutions	49
540	ATI Technologies	115	474	D.P. Computers	335	154	Mattsoft Inc.	237	728	Software Excellence	320
480	AT + T AudioGraphics	338	332	Dresselhaus	347	495	Maynard Electronics	63	488	Software Masters	26
283	Austin Computers	32	187	D.S.I.	364	225	Mendian Technology	321	307	Software Security	105
165	Autodesk	249	187	D.S.I.	364	105	Merritt Computer Products	248	271	Sony Corp.	315
250	Autographix	145	476	Eastman Kodak	91	387	MHI Warehouse	120	390	Speed Computer	50
275	Bay Express	367	505	Elec & Elec	263	352	MICROBEST	352	156	Storage Dimensions	217
275	Bentley Computers	274-275	520	Electronic Wholesale	362	16	MicroCom Systems	16	156	STSC	295
149	Bible Research Systems	120	511	Elite Business	289	20	Micrograph	20	274	Sunfonics	364
218	Bisdesam	252	190	Epson America	190	65-8	Micrograph	65-8	738	Suntech, Inc.	58
283	Blazer Industries	199	216	Evex Systems	74-75	260-261	Microsoft	260-261	298	Swift International	37
125	BoFin Limited	233	376	Executive Systems	299	287	Microsoft	287	745	Symantec Corp.	42
377	Borland	57	391	F&W Communications	358	331	Microway	331	249	Symantec Corp.	39
137	Borland	55	352	FASTMICRO	79	501	Miniscribe	76	173	Sysgen Inc.	246
138	Borland	C2-4	286	Fifth Generation	175	514	Monolithic Systems	390	289	Tandy-Radio Shack	225
6	Borland	1	288	Fifth Generation	193	350	M.S.C. Technologies	279	208	Teleman	22-23
481	Bulldog Computer	66-112	112	Fox Software	64	44-45	Monolithic Computer	44-45	123	Teleman	24-25
481	Bullware Inc.	230	302	Funk Software	167	289	Monolithic Computer	289	519	The Laser Connection	59
730	Calcomp	215	323	Funk Software	169	235	Omni	202	383	The Software Link	276-277
535	Canon U.S.A.	149	266	General Technology	234	368	Omega Press	29	321	Toshiba	337
160	Central Point	70	506	Genex Software	319	175	On-Line Store	357	312	Toshiba	302
120	Central Point	87	239	Genoa Systems	262	14	Oracle	14	223	Traveling Software	162
318	Chiron	235	296	Golden Engineering	236	595	Paradise Systems	184	269	Tuesday Computer	88-90
114	Citizen America	9	369	Golden Bow Systems	4	310	PC Brand	82	329	Vertex Systems	303
188	Clauser Software	134-135	302	Goldfarb Technology, Inc.	329	311	PC Brand	83	127	Vides 7 Inc.	141
198	Command Technology	259	502	Group L	326	308	PC Brand	106	171	Warehouse Data	65-67
200	CompuAdd Corp.	208-213	380	Hammerly Computer	301	309	PC Brand	107	465	Westlake Data	286
205	Compuclassics	53	351	Hard Drives Int'l.	267	301	PC Express	81	515	Wells American	17
300	Computability	353	201	Haventree S.W.	68	304	PC Express	304	312	White Crane Systems	28
284	Computer Associates	311	357	Hewlett-Packard	166-167	303	PC Express	303	528	White Earth Computer	244
109	Computer Discount Warehouse	363	343	Hewlett-Packard P.S.	196	372	PC Connection	228-231	528	WorldPerfect Corp.	154
527	Computer Express	365	305	Houston Instruments	146	353	PC Design	290	500	World Wide Data	248
133	Computer Mail Order	296-297	297	Intel	332	473	PC Power & Cooling	165	518	Yajoust	325
163	Computer Products United	2-3	382	Intelligent Micro Systems	312-313	358	Peachtree Software	336	323	Zenith Data Systems	204
225	Corn International	171	47	Intuit Software	47	489	Personal Computer Support Group	10	721	Zenographics	128
326	Crosslink DCA	218-219	378	Intex	240	483	Personal Computer Support Group	10	721	Zex International	200-201
360	Crescent Software	342	346	Jameco	366	11-13					
472	Curtis Mfg.	117	108	JDR	361						

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201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
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151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200
201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
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551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
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651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900

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EDITORIAL PRODUCT INDEX

READER SERVICE NUMBER	PRODUCT	COMPANY	PAGE	READER SERVICE NUMBER	PRODUCT	COMPANY	PAGE
AFTER HOURS				PRODUCT			
859	Conquering Stress	KJ Software	410	866	Pole	Zenographics	163
857	Diet Analyzer	Natural Software Ltd.	408	877	Presenter PC	Crescent/Discant Inc.	232
860	Dynalink	Caladys Corp.	406	864	Showerman FX	Brightwell-Roberts & Company Ltd.	248
856	Nutrition Wizard	Center for Science in the Public Interest	406	876	Slideworks	Management Graphics Inc.	234
858	PC-Rater	Tri-Image	410	861	SlideWrite Plus	Advanced Graphics Software Inc.	168
861	Race/Mate Challenge	Strategic Studies Group	409	885	35mm Express	Business & Professional Software Inc.	173
854	Reach for the Stars: The Conquest of the Galaxy	Mindscape Inc.	408	863	VCR Concorde	Visual Communications Network	248
855	Willow			886	VideShow 180	General Parametrix Corp.	112
COMPUTERS				GRAPHICS SERVICE BUREAUS			
436	AST Premium Workstation/286	AST Research	50	874	Brilliant Image	253	
440	Micro Palm PC/5000	Micro Palm Computers	51	873	Compulines	253	
432	Mitsubishi MP286L	Mitsubishi Electronics America Inc.	48	872	Expressides Inc.	253	
438	Tandy 4000 LX	Tandy Corp.	51	871	MAGloop	253	
CONNECTIVITY				870	Visual Horizons	253	
430	The Network Sniffer	Network General Corp.	52	HARDWARE			
DESKTOP PUBLISHING				437	Maximum Storage API	Maximum Storage Inc.	52
452	PFS: First Publisher 2.0	Software Publishing Corp.	45	INTEGRATED SOFTWARE			
GRAPHICS				438	AlphaPrinters	Alpha Software Corp.	51
860	Autographics Auto/Visual	Autographics Inc.	222	437	Office Access	Data Access Corp.	38
894	Business Graphics II	Stella Systems	110	LANGUAGES			
893	Chart-Master	Ashion-Tate Corp.	111	444	Microsoft COBOL 3.0	Microsoft Corp.	54
892	Decision Graphics	Sarima Corp.	114	OPERATING ENVIRONMENTS			
862	Draw Applications	Ashion-Tate Corp.	119	433	Windows 286	Microsoft Corp.	38
861	Freelance Plus	Lotus Development Corp.	123	432	Windows 386	Microsoft Corp.	38
860	The Gallery Collection	Hepler-Packard Co.	129	OPERATING SYSTEMS			
889	IBM Graph Presentation	Digital Research Inc.	130	448	DOS 4.0	IBM Corp.	33
876	Gridline	Genlogics Corp.	224	SOFTWARE			
868	Graph Plus	Micrographs Inc.	136	445	Agents	Lotus Development Corp.	33
886	GraphStation	Software Clearing House Inc.	142	434	AutoManager	Cyco International	48
867	Group	Paid Mace Software	243	SPREADSHEET ANALYSIS			
887	Harvard Graphics	Software Publishing Corp.	143	442	@SWLINK	Gadisa Computer Services Inc.	52
886	Image Builder	Communication Dynamics Ltd.	147	TRAINING			
899	Impressional	Execucorp Systems Corp.	188	446	The Programmer's PC Sourcebook	Microsoft Press	54
898	Kretic Graphics System	Kretic Presentations Inc.	188	UTILITIES			
885	Lotus Graphwriter II	Lotus Development Corp.	150	430	Extend-A-Name	World Software Corp.	52
884	Microsoft Chart	Microsoft Corp.	156	431	Applogix Software	334	
897	Mirage	Zenographics	194	448	Readability	Scandinavian PC Systems	43
893	Mindbuss	Media Cybernetics Inc.	156	443	ScreenExtender	Stamney Software	48
875	PCchart	Astix Inc.	226	PRODUCTIVITY			
866	PC Enlace	Computer Support Corp.	247	DEPARTMENT			
865	PC Storyboard Plus	IBM Corp.	245	PROGRAM NAME/DESCRIPTION			
872	Personal Business	Management Graphics Inc.	228	Utilities	Convert binary files into BASIC ASCII programs with MAKEBAS	263	
868	Picture Perfect	Computer Support Corp.	181	Environments	An exploration of the Presentation Manager dialog box procedure	261	
PRODUCTIVITY				Power Programming	Implementing the Quickstart routine in an assembly language program	307	
DEPARTMENT				Spreadsheet Clinic	A macro that starts you when 1-2-3 is finished recalculating	317	
PROGRAM NAME/DESCRIPTION				Spreadsheet Clinic	Prevent users from rebooting when freezing a screen to speed up a macro	317	
PAGE				Spreadsheet Clinic	Another good method that returns you to your starting place in a worksheet	318	
Utilities				Spreadsheet Clinic	Simply changing LaserJet setup strings for printing worksheets	318	
Convert binary files into BASIC ASCII programs with MAKEBAS				Spreadsheet Clinic	Display a full screen list of range names in Lotus 1-2-3	320	
An exploration of the Presentation Manager dialog box procedure				User-to-User	A fast and easy way to send hex codes to any DOS character device	325	
Implementing the Quickstart routine in an assembly language program				User-to-User	Use the DOS FIND command to locate a string in multiple set of files	328	
A macro that starts you when 1-2-3 is finished recalculating				Power User	Active uniform protocols by using explicit defaults in WordPerfect	333	
Prevent users from rebooting when freezing a screen to speed up a macro				Power User	Produce underlined reports that read like printed paper reports	333	
Another good method that returns you to your starting place in a worksheet				Power User	A macro in WordPerfect that replaces hard returns with soft returns	333	
Simply changing LaserJet setup strings for printing worksheets				Power User	COUNT.PSM counts the occurrences of characters or strings in a file	334	
Display a full screen list of range names in Lotus 1-2-3				Power User	Use SuperKey to create recursive macros in Microsoft Word	336	
A fast and easy way to send hex codes to any DOS character device				Power User	Understanding how BASIC stores numbers and numeric variables	339	
Use the DOS FIND command to locate a string in multiple set of files				Power User	STING.C searches Word DOC files for keywords and character strings	340	
Active uniform protocols by using explicit defaults in WordPerfect				Power User	Techniques for writing self-modifying programs in Turbo Pascal	343	
Produce underlined reports that read like printed paper reports				Power User	A step-by-step tutorial for working with PC Magazine DRBUS scripts	343	
A macro in WordPerfect that replaces hard returns with soft returns				Power User	Customize applications for a workstation using the adapter address	347	
COUNT.PSM counts the occurrences of characters or strings in a file				Power User			
Use SuperKey to create recursive macros in Microsoft Word				Power User			
Understanding how BASIC stores numbers and numeric variables				Power User			
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COMING UP

DOS ON THE FLY Portable PCs are narrowing the performance gap with desktop machines, becoming not only quality companions on the road but viable contenders for the space on your desk at the office or at home. Executive editor Bill Howard "taste-tests" the market situation, and our reviewers rate 12 80286- and 80386-based portables from Compaq, Datavard, Dolch, Mitsubishi, Sharp, Toshiba, and Zenith.

CALCULATED RISKS Project management software is evolving to meet critical business needs, with improved planning techniques and greater sophistication in handling resources, costs, and progress reports. Reviewer Henry Fersko-Weiss evaluates four programs under \$595 and previews the beta release of *Harvard Project Manager*—products that could help make your venture a success.

HARD DISK DEFRAGMENTERS Scattered and noncontiguous files not only slow your operating time but also make lost files harder to find. Speed up your PC's performance as you clean up your hard disk with one of the 13 programs reviewed by contributing editor Edward Mendelson.

LIM 4.0 MEMORY MULTIFUNCTION BOARDS Contributing editor Winn L. Rosch examines the hardware that lets you take advantage of LIM 4.0's enhanced memory-addressing and multitasking capabilities and gives you the memory you'd need for OS/2. Rosch reviews products from AST Research, Boca Research, Intel Corp., Micron Technology, Newer Technology, and Orchid Technology.

MAGNETIC MIGRATIONS Half-inch magnetic tape is a cost-effective medium for regularly moving data between PCs and mainframes. Our workgroup systems editor, Frank J. Derfler, Jr., evaluates controllers and tape drives from such vendors as Alloy Computer, Catamount, Emerald Systems, Innovative Data Technology, Overland Data, and Qualstar.



ADVERTISERS PRODUCT INDEX

ADVERTISERS PRODUCT INDEX

RS#	ADVERTISER	PRODUCT	PAGE#
ACCOUNTING SOFTWARE			
284	Computer Associates	ACC PACC.....	311
220	DAC Software	Accounting Software.....	69
263	Macola Inc.	Accounting Software.....	142
358	Peachtree Software	Accounting Software.....	338

DATABASE MANAGERS			
471	Askcom System	Database Managers.....	86
377	Borland International	Paradox.....	57
494	Borland	PC File.....	298
333	Digital Composition Systems	DB Publisher.....	257
376	Executive Systems	Xbase/Xbase Pro.....	299
112	Fox Software Inc.	MAC Database.....	64
402	Oracle	Database Management Software.....	14
282	Personics Corp.	a Base.....	18-19
745	Symantec Corp.	D & A.....	42

FILE SYSTEMS & ACCESS METHODS			
502	Group L Corporation	Memory Lane.....	320
	Micro Com Systems	Multifunction Public Domain SW.....	16

FINANCIAL PLANNING SOFTWARE			
	Intuit Software	Financial Planning Software.....	47

INFORMATION MANAGERS			
277	DAC Software	Hold Everything.....	121
	Micro Com Systems	Multifunction Public Domain SW.....	16

INTEGRATED SOFTWARE			
	Lotus	Symphony.....	316

LANGUAGES			
360	Crescent Software	Basic Programming Tools.....	342
	Microsoft	Quick Basic 5.0.....	C8
331	Microway	Fortran Compiler.....	349

OPERATING SYSTEMS/ENVIRONMENTS			
245	Santa Cruz Operation, Inc.	SCD Xenix.....	72
363	Software Link, Inc.	PC MDK.....	276-277

PROGRAM DEVELOPERS/GENERATORS			
134	Clanton Software	Clanton.....	134-135
360	Crescent Software	Basic Programming Tools.....	342

PROJECT MANAGEMENT			
249	Symantec Corp.	Timeline 2.0.....	39

STATISTICAL SOFTWARE			
154	Math Soft Inc.	Math Cad.....	237
156	STSC	Atlas Graphics.....	295

TEXT EDITORS			
168	Command Technology Corp.	SPF/PC.....	259

UTILITIES			
160	Central Point Software	Copy II PC.....	70
120	Central Point Software	PC Tools Deluxe.....	87
134	Clanton Software	Clanton.....	134-135
360	Crescent Software	Basic Programming Tools.....	342
390	Dorian	Hard Card.....	265
322	Daybreak Technologies	Cocoon.....	157
376	Executive Systems	Xbase/Xbase Pro.....	299
323	Funk Software	Worksheet Utilities.....	189
369	Golden Box Systems	V-Cache.....	4
502	Group L Corporation	Memory Lane.....	320
360	Hammerly Computer Services, Inc.	Pro Bas.....	301
280	LaserGo Inc.	Go Script.....	21
105	M.H. Group, Inc.	Word Processing Conversion SW.....	120
	Micro Com Systems	Multifunction Public Domain SW.....	16
469	Personal Computer Support	Breakthru.....	10
	Quard Software Ltd	Utilities.....	344
	Rose Electronics	Utilities.....	345
334	Softlogic Solutions	Passport.....	328
726	Software Excellence	Desk Optimizer.....	49
498	Software Masters	Shareware Products.....	320
498	Software Masters	Software Masters Back To DOS.....	26
498	Software Masters	Software Masters Savior.....	26
498	Software Masters	Software Masters Spool Masters.....	26
498	Software Masters	Software Masters Flash.....	26
312	White Crane Systems	Brooklyn Bridge.....	28

WORD PROCESSING SOFTWARE/AIDS			
218	Betstream	Fontware.....	252
137	Borland International	Spring.....	55
502	Group L Corporation	Memory Lane.....	326

RS#	ADVERTISER	PRODUCT	PAGE#
CAD/CAM			
479	Micro Com Systems	Multifunction Public Domain SW.....	16
508	Rightsoft, Inc.	Word Processing Software/Aids.....	78
518	Wordperfect Corporation	Wordperfect 5.0.....	154
	Xyquest	Xywrite III Plus.....	205

SPREADSHEET/TEMPLATES			
136	Borland International	Quattro.....	C2-4, p1
374	Daybreak Technologies	Soft Spreadsheet.....	159
302	Funk Software	Sideways.....	187
	Microsoft	Excel.....	C5-7
483	Personal Computer Support Group	Lucid.....	11-13

DESK TOP PUBLISHING			
218	Betstream	Fontware.....	252
535	Canon USA Inc.	Desktop Publishing.....	149
333	Digital Composition Systems	DB Publisher.....	257
743	Digital Research	Gem.....	103
280	LaserGo Inc.	Go Script.....	21
299	Swift International, Ltd	Glyphix.....	37
259	The Laser Connection	Microscript.....	5

VERTICAL MARKET SOFTWARE			
149	Bible Research Systems	The Word Processor.....	120

FORM DESIGNERS			
356	Delrina Technology	Form Generating Software.....	169

BACKUP SOFTWARE			
485	Westlake Data Corp	Backup Software.....	286

DISK BACKUP & TAPE DRIVES			
225	Core International	Core Fast 2.0.....	171
286	Fifth Generation	Fastback Plus.....	175
378	Formage Corporation	Removable Mass Storage.....	240
193	Kinson Products	Disk Drives.....	96
495	Maynard Electronics	Take Back-Up.....	63
173	Sysgen Inc	Bridge File.....	246

HARD DISKS			
351	Hard Drives International	Hard Disks.....	267
341	Lifetime Memory Products	Hard Disk Drives.....	258
501	Miniscribe Corp	Hard Drives.....	76
514	Monolithic Systems	Just Ram Memory Board.....	300
164	Plus Development	Hard Card.....	118-119
161	Storage Dimensions/Master	Large Capacity Hard Discs.....	217

COMPUTERS/COMPATIBLES			
270	Alec Technology Corp.	PC's.....	133
335	American Miac	Paragon 286.....	233
111	Archie Technologies	Archie Rival.....	175
166	AST Research	Workstation.....	238-239
509	Austin Computers	Compatibles.....	32
275	Bentley Computers	Compatibles.....	274-275
481	Buildup Computer Products	Computer/Compatibles.....	60-61
294	Compu Aid	Compatibles.....	208-213
163	Computer Products Units	Computer/Compatibles.....	2-3
484	Data media	Color Scan/2.....	146
533/536	Dell Computer Corp.	PC Compatibles.....	180-183
216	Everex Systems, Inc.	Desktop Computers.....	74-75
357	Hewlett Packard-Vectra	Vectra PC.....	186-187
297	Intel	Intel 386 Chip.....	332
382	Intelligent Microsystems	Compatibles.....	318-313
	Northgate Computer Systems	386 Machine.....	44-45
372	PC Designs	Compatibles.....	290
390	Speed Computer Systems	386 PC's.....	50
289	Tandy-Radio Shack	Compatible.....	255
329	Veritas Systems	PC.....	303
515	Wells American	Computers/Compatibles.....	17
721	Zeos International	Compatible.....	200-201

INPUT DEVICES			
742	Diamond Power	Handy Scanner HS-3000.....	327
244	Kye Tronic	Mouse.....	304-305
492	Kye International	Genius Mouse.....	127
	Microsoft	Mouse.....	280-281
35	MSC Technologies	Optical Optomechanical Mouse.....	279
	Northgate Computer Systems	Keyboard.....	289

PROGRAMMERS TOOLS UTILITIES			
360	Crescent Software	Basic Programming Tools.....	342
296	Glenco Engineering	Programmers Tools.....	236

RS#	ADVERTISER	PRODUCT	PAGE#
380	Hammerly Computer Services, Inc.	Pro Bus	301
ADD-ON BOARDS			
160	Central Point Software	Copy II PC Deluxe Option Board	70
127	Video 7	Vega VGA	141
SCANNERS/DIGITIZERS			
480	ATA&T Audiographic Comm. System	Overview Scanner	138
730	Calcomp	Digitizer/2300	215
318	Scanners	Scanners	235
213	Digital Vision Inc.	Computer Eyes	328
182	Logitech	Scanman	322-323
PRINTERS			
725	Adobe	Postscript	330-331
242	Alps America	Printers	190-191
283	Blaser Industries	Printer	199
114	Citizen America Printer	Printers	9
747	Destiny Technology	Laser Acl II	270
*	Epson	Printers	160
280	LaserGo Inc.	Go Script	21
224	Mannesman Tally	Laser Printers	131
232	Odatata	Printer	202
745/361	Gurte	Laser Printer Division	206
498	Seikosha Corp.	Printer	306
321	Toshiba	Dot Matrix	337
PRINTER ACCESSORIES			
477	Applied Creative Technology, Inc.	Systemizer Plus	286
332	Grosselhaus Computer Prod.	Smart Print	302
598	Fits Generation	Logical Connection Products	193
290	Rose Electronics	MasterSwitch	378
290	Rose Electronics	Porter	328
PORTABLE/LAP COMPUTERS			
217	Linson Systems	Mitsubishi Laptops	288
DISPLAYS/MONITORS/TERMINALS			
480	ATA&T Audiographic Comm. System	Overview Scanner	138
511	Elite Business Applications	Monitor	289
478	Eastman Kodak	Datashow	91
478	Magnum	Monitor	137
209	Princeton Graphics	Color Monitors	220
490	Seiko Instruments	Color Monitors	108
337	Zenith Data Systems	Monitors	324
GRAPHICS SOFTWARE			
324	Ashton Tate	Draw Appliance	280-281
201	Haventree Software	Graphics Software	68
343	Hewlett-Packard PS	Graphics Gallery	196
*	Lokus	Freelance Plus	223
*	Lokus	Freelance Plus	223
*	Lokus	Graphwriter	151
*	Lokus	Graphwriter	151
*	Micrograph	Graphics Software	20
325	Zenographics	Pixie	128
PRESENTATION GRAPHICS			
260	Autographix	Autographix System	145
BUSINESS ANALYSIS GRAPHICS			
156	STSC	Atlas Graphics	295
PLOTTERS/CHARTING DEVICES			
305	Houston Instruments	Plotter	146
VIDEO GRAPHICS BOARDS			
540	ATI Technologies Inc.	VGA Board	115
213	Digital Vision Inc.	Computer Eyes	328
238	Genoa Systems Corp.	VGA Board	262
150	Goldstar Technology, Inc.	Video Graphics Boards	329
359	Paradise Systems	VGA Professional Plus	184
393	Software Link, Inc.	VNA	276-277
ACCELERATOR BOARDS			
474	OP Computers	WaveMate	335
489	Personal Computer Support	Baskithru	10
COMMUNICATIONS SOFTWARE			
326	Crescent/DCA	Remote 2	218-219
504	Data Storm Technologies Inc.	Communications Software	216
228	Meriden Technology	Carbon Copy Plus	321
290	Rose Electronics	Passport	308
223	Travelling Software	Laplink	162
312	White Crane Systems	Brooklyn Bridge	28
LOCAL AREA NETWORKING			
290	Rose Electronics	MasterSwitch	378
393	Software Link, Inc.	Lanlink	276-277
MODEMS			
505	Elec + Etik	Modems	283

RS#	ADVERTISER	PRODUCT	PAGE#
DISKETTES			
*	3M Data Recording Products Div	3M Preformatted Diskettes	245
267	3M Data Recording Products Div	3M Magnetic Media	247
271	Sony Corporation of America	Diskettes	315
*	Toshiba	Magnetic Media	302
POWER PROTECTION			
473	PC Power and Cooling	Power Supplies	165
SECURITY			
307	Software Security	Software Protection	105
500	World Wide Data	Vaccine Software	248
PC ACCESSORIES			
472	Curtis Manufacturing	PC Accessories	117
272	Kensington Microware Ltd.	Accessories	172
347	Merritt Computer Products	Saleskin	248
473	PC Power and Cooling	Power Supplies	165
TRAINING SEMINARS			
*	Microsoft	Microsoft University	287
MAIL ORDER			
106	707 Computer Sales	Mail Order	360
386	Application Technologies	Mail Order	227
336	Arington Computer Products	Mail Order	354-355
509	Avlon Computer	Computer Ability	362
*	Bay Express	Mail Order	367
275	Bentley Computers	Mail Order	275-276
125	Boffin Limited	Mail Order	293
481	Buff Dog Computer Products	Mail Order	60-61
294	Compu Add	Mail Order	206-213
205	Computer Classics	Mail Order	333
300	Computer Ability	Mail Order	353
109	Computer Discount Warehouse	Mail Order	363
527	Computer Express	Mail Order	365
183	Computer Mailorder	Mail Order	296-297
229	Discount Micro Products	Mail Order	250-251
187	Durable Solutions Inc.	Mail Order	364
520	Electronic Wholesale House	Mail Order	362
352	F&W Communications	Mail Order	79
391	F&W Communications	Mail Order	358
266	General Technology Corp.	Mail Order	234
351	Hans Drives International	Mail Order	257
382	Intelligent Microsystems	Mail Order	312-313
346	Jamco Electronics	Mail Order	366
108	JDR Micro Devices	Mail Order	361
367	MHI Warehouse	Mail Order	367
*	MICROBEST	Mail Order	352
368	Omega Press	Software Mail Order	29
*	On Line Store	Mail Order	357
219/311	PC Brand	Mail Order	82-83
308/309	PC Brand	Mail Order	106-107
301	PC Express	Mail Order	81
*	PC Connection	Mail Order	228-231
353	PC Network (Formerly IMT)	Mail Order	356
385	S.C. Systems	Mail Order	80
194	Shamrock	Mail Order	363
206	Silicon Specialists	Mail Order	22/23
*	Softline	Mail Order	84
738	Sunny Tech	Mail Order	58
274	Suntronics	Mail Order	364
206/123	Suntronics	Mail Order	22-25
*	Tussey Computer Products	Mail Order	86-89
171	Warehouse Data Products	Mail Order	86-87
326	Whole Earth Computer	Mail Order	244
MISCELLANEOUS			
140	Bbbe Research Systems	The Word Processor	120
541	Polaroid	Computer Slide Maker	100-101
DIRECT MARKETING CONNECTION			
106	707 Computer Sales	Mail Order	360
336	Arington Computer Products	Mail Order	354-355
509	Avlon Computer	Mail Order	362
*	Bay Express	Mail Order	367
275	Bentley Computers	Mail Order	275-276
125	Boffin Limited	Mail Order	293
481	Buff Dog Computer Products	Mail Order	60-61
294	Compu Add	Mail Order	206-213
205	Computer Classics	Mail Order	333
300	Computer Ability	Mail Order	353
109	Computer Discount Warehouse	Mail Order	363
527	Computer Express	Mail Order	365
183	Computer Mailorder	Mail Order	296-297
229	Discount Micro Products	Mail Order	250-251
187	Durable Solutions Inc.	Mail Order	364
520	Electronic Wholesale House	Mail Order	362
352	F&W Communications	Mail Order	79
391	F&W Communications	Mail Order	358
266	General Technology Corp.	Mail Order	234
351	Hans Drives International	Mail Order	257
382	Intelligent Microsystems	Mail Order	312-313
346	Jamco Electronics	Mail Order	366
108	JDR Micro Devices	Mail Order	361
367	MHI Warehouse	Mail Order	367
*	MICROBEST	Mail Order	352
368	Omega Press	Software Mail Order	29
*	On Line Store	Mail Order	357
219/311	PC Brand	Mail Order	82-83
308/309	PC Brand	Mail Order	106-107
301	PC Express	Mail Order	81
*	PC Connection	Mail Order	228-231
353	PC Network (Formerly IMT)	Mail Order	356
385	S.C. Systems	Mail Order	80
194	Shamrock	Mail Order	363
206	Silicon Specialists	Mail Order	22/23
*	Softline	Mail Order	84
738	Sunny Tech	Mail Order	58
274	Suntronics	Mail Order	364
206/123	Suntronics	Mail Order	22-25
*	Tussey Computer Products	Mail Order	86-89
171	Warehouse Data Products	Mail Order	86-87
326	Whole Earth Computer	Mail Order	244
MISCELLANEOUS			
140	Bbbe Research Systems	The Word Processor	120
541	Polaroid	Computer Slide Maker	100-101
DIRECT MARKETING CONNECTION			
106	707 Computer Sales	Mail Order	360
336	Arington Computer Products	Mail Order	354-355
509	Avlon Computer	Mail Order	362
*	Bay Express	Mail Order	367
275	Bentley Computers	Mail Order	275-276
125	Boffin Limited	Mail Order	293
481	Buff Dog Computer Products	Mail Order	60-61
294	Compu Add	Mail Order	206-213
205	Computer Classics	Mail Order	333
300	Computer Ability	Mail Order	353
109	Computer Discount Warehouse	Mail Order	363
527	Computer Express	Mail Order	365
183	Computer Mailorder	Mail Order	296-297
229	Discount Micro Products	Mail Order	250-251
187	Durable Solutions Inc.	Mail Order	364
520	Electronic Wholesale House	Mail Order	362
352	F&W Communications	Mail Order	79
391	F&W Communications	Mail Order	358
266	General Technology Corp.	Mail Order	234
351	Hans Drives International	Mail Order	257
382	Intelligent Microsystems	Mail Order	312-313
346	Jamco Electronics	Mail Order	366
108	JDR Micro Devices	Mail Order	361
367	MHI Warehouse	Mail Order	367
*	MICROBEST	Mail Order	352
368	Omega Press	Software Mail Order	29
*	On Line Store	Mail Order	357
219/311	PC Brand	Mail Order	82-83
308/309	PC Brand	Mail Order	106-107
301	PC Express	Mail Order	81
*	PC Connection	Mail Order	228-231
353	PC Network (Formerly IMT)	Mail Order	356
385	S.C. Systems	Mail Order	80
194	Shamrock	Mail Order	363
206	Silicon Specialists	Mail Order	22/23
*	Softline	Mail Order	84
738	Sunny Tech	Mail Order	58
274	Suntronics	Mail Order	364
206/123	Suntronics	Mail Order	22-25
*	Tussey Computer Products	Mail Order	86-89
171	Warehouse Data Products	Mail Order	86-87
326	Whole Earth Computer	Mail Order	244

AFTER HOURS



FITNESS

Eating Healthy to Stay Fit: Two Programs Help You Keep Track of Your Daily Diet

BY DONALD B. TRIVETTE

If you're putting on too many pounds sitting in front of your computer, the problem may now be part of the solution. Natural Software and the Center for Science in the Public Interest have developed nutrition and diet programs to help you keep track of what you eat.

Diet Analyzer

Diet Analyzer, from Natural Software, is a \$49.95 caloric spreadsheet; you enter foods and quantities in the first two columns, and this nifty program then calculates how many calories are stoking your furnace. The other columns display the amount of fat, protein, carbohydrates, cholesterol, fiber, calcium, phosphorus, iron, sodium, potassium, magnesium, niacin, and vitamins in the food.

The spreadsheet also shows your daily caloric goal and your actual total intake. It's almost too easy to see the calories accumulate.

Of course, almost anyone

ESTIMATE YOUR CALORIE NEED: 16 per hour or Total Calories

SEDENTARY, sleeping or resting, watching television, office work or house work that involves little or no arm or leg movement.

LIGHT, limited and standing activities, light arm movement, walking, climbing, light work, typing, cooking, housework, playing musical instrument.

MEDIUM, walking moderately fast (3.5-5 mph), walking upstairs, shopping with light load, golf, sailing.

ACTIVE, walking or moving quickly (5.5-6 mph), climbing stairs, shopping with heavy load, cycling, tennis, brisk walking.

HEAVY, exceptionally strenuous, physically demanding activities, such as running, vigorous sports, mountain climbing, heavy labor.

1 = SEDENTARY	1.00 hrs.	1.20 Cal/Min	120 Cal
2 = LIGHT	2.00 hrs.	1.50 Cal/Min	300 Cal
3 = MEDIUM	3.00 hrs.	2.00 Cal/Min	600 Cal
4 = ACTIVE	4.00 hrs.	2.50 Cal/Min	1000 Cal
5 = HEAVY	5.00 hrs.	3.50 Cal/Min	1750 Cal
6 = TOTAL	15.00 hrs.		3870 Cal

5 lbs to Change (3-5) Fat Hours, 6 for Total Calories

Nutrition Wizard computes the calories you'll need from a description of your daily activities.

could set this up in 10 minutes on a standard spreadsheet. The power behind *Diet Analyzer* is its food dictionary. Suppose you just ate a McDonald's hamburger for lunch: simply type McDonald's, and watch the program regurgitate most of the fast-food giant's menu from its database.

Or perhaps you've had a Swiss on rye. You first have to fetch the individual ingredients from the database, but then you can add the whole sandwich to the file. The database comes with a thousand-plus foods and ingredients.

The program is particularly smart about quantities. Each food has a standard measure—bread, for example, is stored as a slice—but the program can also recognize alter-

nate quantities, such as 3 ounces of bread.

All is not peaches and cream with the *Diet Analyzer*, though. The program does not use a personal profile—age, sex, height, weight, life-style—to calculate nutritional goals. You must determine those on your own. The best the manual can do is to tell you that your daily protein intake should be your calories multiplied by .038, and your saturated fat should be calories multiplied by .33. The manual suggests that you use a hand calculator to compute these values. That's intolerable—at the very least the program should make the calculations for you.

The program can store daily totals so that you can have a diet history at your fingertips. This is a valuable tool for obtaining a weekly or monthly average. Unfortunately, the program is designed to store diet histories for only one person—the only way to get around this is to install copies of the program in separate subdirectories.

Nutrition Wizard

Nutrition Wizard was developed by the nonprofit Center for Science in the Public Interest, a Washington-based group that has been at the forefront of the movement urging public disclosure of nutritional values on food packaging and promoting a healthier diet.

The \$99.95 program was de-

signed with families in mind. Each member fills out a personal profile containing information about his age, sex, weight, and height and then completes a section that describes typical activities for a 24-hour period. From that information, *Nutrition Wizard* computes requirements for vitamins, minerals, fats, and calories.

This program knows how America eats. The fast-food section has menus from 15 of our favorite chains, from Arby's to Wendy's. The food database contains about 1,800 items. It too allows you to build a sandwich or meal and add it to the database.

Nutrition Wizard is not organized as a spreadsheet, so the user interface isn't quite as friendly as *Diet Analyzer*'s. You enter the first five characters of a food, and the dictionary displays your choices. Just pick the food you ate, and type in its four-digit code number. Food quantities may be adjusted, but the conversion routine is not as powerful as the one found in *Diet Analyzer*.

The biggest problem with *Nutrition Wizard* is that it lacks a diet-history feature. The program is not designed to save data from one day to the next, so you really can't get an idea about how well or how poorly you are doing—except perhaps by checking if you can pinch more than an inch.

List Price: *Diet Analyzer*, \$49.95. **Requires:** 256K RAM, one disk drive, mono or color display, DOS 2.0 or later. Not copy protected. Natural Software Ltd., 129 Pearsall Pl., Ithaca, NY 14850; (800) 626-2511.

CIRCLE 657 ON READER SERVICE CARD

List Price: *Nutrition Wizard*, \$99.95. **Requires:** 128K RAM, two disk drives, mono or color display, DOS 2.0 or later. Not copy protected. Center for Science in the Public Interest, 1501 16th St., NW, Washington, DC 20036; (202) 332-9110.

CIRCLE 656 ON READER SERVICE CARD

Will Diet Analyzer - Mark Shook
Copyright (c) Natural Software Limited 1994, 1995

Food Description	Amount	Cal (kcal)	Prot (g)	Fat (g)	Carb (g)
chicken (skin)	2 oz	208	16	16	2
type bread, light, toasted	2 slices	138	4	2	24
mayonnaise, regular	2 tbsp	180	3	22	0
lettuce, sliced	1 oz	30	1	0	2
pepper	12 Pin	10	0	0	0
potato chips	10 chips	165	3	12	18
Subtotal:	Total =	641	26	30	24
100 cal = 20 g	Total = 404	2580	38	0	0

Enter amount:

Options: Left Right Print Left program Help

You can enter the type of food you ate (and the amount of it) into *Diet Analyzer*; the program then computes the caloric and nutritional values.



GAMES

Willow: Seven Games In One Small-Screen Adventure

BY ROBIN RASKIN

Willow, the movie, and *Willow*, the computer game from Mindscape, both show the influence of many sources. The movie's good-triumphs-over-evil plot was inspired by every fable, fairy tale, and archetype known to the western world. Like its big-screen counterpart, the game draws its inspiration from the most popular types of computer games. *Willow* is seven minigames rolled into one sometimes choppy, but definitely multifaceted, adventure.



ha, ha, ha, ha, ha —
So, you think you can defeat me!
Not this time, little one. Try again,
if you dare...

Queen Bavmorda's sneering digitized image mocks you whenever you fail to successfully complete any of the seven Willow adventures.

A scroll that recaps the story of the elfin Willow Ufgood unfolds across your screen and binds the various games together. In one game you are Ethna, trying to escape from the mazes within Nockmaar Castle, the evil Queen Bavmorda's stronghold. In another, you are Willow, traveling through a maze of swampy woods filled with Mad Dogs and Nockmaar Troops. Next, you choose which cage holds Madmartigan, the maverick master swords-

man, and which holds the Skeleton of Death.

Those who enjoy pattern-matching exercises will delight in the Spellcasting module and more-action-oriented players will enjoy the grand finale, a shoot-'em-up assault on Nockmaar Castle.

You can play the game in practice mode, moving freely between the modules by clicking on a highlighted word in the scroll. In quest mode you get eight chances to defeat the Queen in each adventure. Should you fail in any adventure, a digitized image of Queen Bavmorda dares you to try again—from the very beginning.

When you at last master every turn in the original game, an automatic reset option creates new maps, new scenes, and new spells.

Willow is good for hours of

The Reach for the Stars screen displays some 52 "twinkling" stars laid out on a honey-combed grid map. Maintaining colonies on the planets requires careful monitoring of social conditions.



GAMES

Reach for the Stars: A Guide to Galactic Expansionism

BY P.J. SPRINGER

Strategic Studies Group has delivered an intricate space-conquest game that embodies the name of the company: strategy. *Reach for the Stars: The Conquest of the Galaxy* provides a challenging arena for even the most detail-oriented computer game player.

The premise of the game is the exploration and eventual control of the galaxy. You establish your empire by building up colonies on various planets.

Each of up to four players begins the game orbiting a randomly selected planet with four Mark I battleships, four scout vessels, and 60 transports. Each player also is allocated 400 Global RPs, or resource products, which are an economic currency used for everything from constructing new ships to initiating and maintaining colonies.

Upon arriving at each new planet, you'll be required to formulate a long-range, detail-oriented strategy. You'll have to monitor both social and plan-

etary environmental conditions, since these can determine the contentedness—or revolutionary tendencies—of any of your colonies. New technology isn't available to you until you have developed your colonial industries to a certain capacity; only then may you construct superior Mark IIs, IIIs, and IVs that will enable you to dominate other players' empires.

Confrontations with your opponents are represented by instantaneous "bleepings" of your computer, accompanied by quick flashes of light—which you'll notice only if you're visually diligent. Then it's over, with retreat options or new tallies immediately provided by the computer. A little bit of on-screen action would have been a fitting reward for all the players' efforts.

Reach for the Stars is the perfect game for someone who enjoys concocting strategic plans. But anyone who is looking for action will resent the tedium of decision making and the lack of visual diversity. **LIST PRICE:** *Reach for the Stars: The Conquest of the Galaxy*, Third Edition, \$44.95. **REQUIRES:** 256K RAM, 3½-inch or 5¼-inch disk drive, DOS 2.1 or later. Not copy protected. Strategic Studies Group, distributed by Electronic Arts, P.O. Box 7579, San Mateo, CA 94403; (415) 571-7171.

CIRCLE 666 ON READER SERVICE CARD

CIRCLE 664 ON READER SERVICE CARD

AFTER HOURS



FITNESS

Computer Soma: Two Brave New Programs Help You Sit Back And Relax

BY JONATHAN MATZKIN

Scientists are just beginning to understand the havoc that stress wreaks in our personal and professional lives. It has already been linked to cancer, heart disease, suicide, divorce, and job burnout. It will be many years before its effects are fully understood.

In the meantime, two software houses offer packages designed to relieve stress through use of the PC—which, ironically, may itself be the source of some stress in the workplace.

Conquering Stress

Conquering Stress, from KJ Software, is an elaborate, \$179 hardware-and-software-based training program that teaches

Conquering Stress is a tutorial on the causes and signs of stress; you begin by answering a series of questions about your demeanor and life-style, and the program then suggests the order in which you should work through the different sections of the tutorial. You can put your new understanding of stress to work with the hardware component of the Conquering Stress package.

The biofeedback device measures muscle tension as an index of stress. You put on a corduroy headband that contains three small sensors. The headband plugs into a small, battery-powered processor, which in turn connects to a game card adapter installed in your PC's bus.

Software for the biofeedback monitor is on a separate disk from the main portion of the tutorial. The most interesting interpretation of your stress level is an on-screen graph that continuously plots your stress as you tense up or relax. This view—which looks somewhat like an EKG readout—is quite fascinating, as you watch the

You can graphically interpret your stress level using the Conquering Stress package's biofeedback software. The software is controlled via a biofeedback device that measures muscle tension as an index of stress.



any traditional interaction with the machine is unnerving, to say the least.

An on-screen kaleidoscope is supposed to display changes in tension levels by producing cooler colors and patterns to reflect deeper relaxation. I found this rather hard to follow; I had much better success with the more straightforward graph.

PC-Relax

PC-Relax is a software-only relaxer. It presents an ever-changing abstraction of colors and shapes that form and reform on your screen. You can influence the display by tapping number keys that produce different kinds of images. Number keys 1 through 7 generate images deemed to be relaxing, while 9 and 10 produce stimulating visuals.

PC-Relax also periodically displays a full-screen clock image that reports your system time. The clock is then gradually overrun by colorful patterns, only to reappear again at a later time.

PC-Relax runs on color-graphics systems, or on Hercules systems with a CGA emulator. The supplied CGA emulator didn't work with my monochrome system, but I got good results using Athena BIOS, from Athena Digital. Whether in color or monochrome, the images that are generated by PC-Relax are

soothing, absorbing, and sometimes unexpectedly beautiful.

The makers of both Conquering Stress and PC-Relax are quick to disavow any proven medical benefits of their products. In my unscientific tests, however, I found both products to be quite useful in helping me to relax.

Conquering Stress is the more ambitious of the two packages, since it focuses on an individual's life-style for the roots of stress. Then it suggests some helpful techniques that can be used in conjunction with the hardware to eradicate that harmful tension.

PC-Relax is a more modest solution, but it is good for stealing a few minutes of quiet contemplation in the middle of a high-pressure day.

List Price: Conquering Stress, \$179. **Requires:** 256K RAM, one disk drive, game port, DOS 2.0 or later. Software not copy protected. KJ Software, Wessinghouse DTS Catalog, P.O. Box 3377, Pittsburgh, PA 15230; (800) 338-DISC.

CIRCLE 856 ON READER SERVICE CARD

List Price: PC-Relax, \$39. **Requires:** 256K RAM, CGA or Hercules card with CGA emulation software, DOS 2.0 or later. Not copy protected. Tru-Image, P.O. Box 660, Cooper Station, New York, NY 10276; (212) 777-7609.

CIRCLE 856 ON READER SERVICE CARD

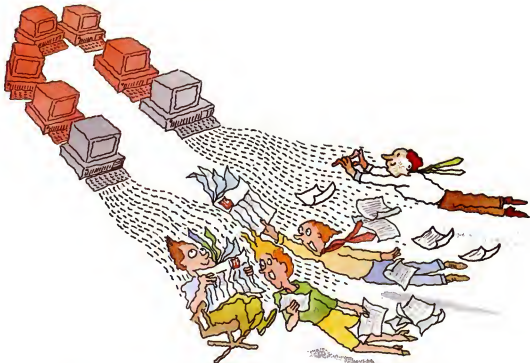


PC-Relax is a kaleidoscope for your PC. You can influence the patterns and colors that develop on your display by tapping number keys.

you about stress and shows you how to dissipate it. Tru-Image's PC-Relax (\$39) is a software-only relaxer that soothes or stimulates with an ever-changing kaleidoscope pattern of colors and shapes that continuously evolve on your screen.

falling graph mirror your decreasing tension level.

There is also a game in which you control movement of an object on the screen entirely by varying the tension level in your forehead. Producing changes on the screen without



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AFTER HOURS



FITNESS

Fitness Software Banishes Boredom Of Riding a Stationary Bicycle

BY MYRON A. MATZKIN

You see very few happy faces riding exercise bicycles. Spinning to nowhere is—at the very least—incredibly boring. You end up with a terrific body and a petrified brain. Luckily, RacerMate and Calladine Corp. have developed PC programs that may save the minds of dedicated fitness seekers.

The *RacerMate Challenge* software works in conjunction with RacerMate's Computrainer, a device that converts your ten-speed into a stationary exercise cycle. You simply remove the front wheel and lock your bike in place on the Computrainer's frame. The rear wheel of your bike rests on a spindle with an AC-powered magnet that simulates actual road conditions. A handlebar-

mounted control panel connects to your PC via a serial port. The complete system sells for \$750.

The software's main screen has a profile of the "course" you will be following and also supplies you with information about the grade, the wind, and the distance between you and your opponent.

Your opponent can be either a live person on another trainer or a computer-supplied "pacer." You are given data on miles per hour and average speed, as well as distance covered and calories burned.

The *Dynalink* system, from Calladine, takes a different, less-expensive tack. It works with any bike trainer—wind or magnetic—and can be adapted to a stationary bike. The hardware consists of a bus interface card and a speed and cadence sensor module. There's also an optional heart-rate monitor.

The sensor attaches to the bike so that it can optically read the rotation of the wheel.

Selecting the standard workout from the main screen brings up a display showing speed, calories burned, cadence, and time and distance covered.

The optional heart rate monitor adds interest to a workout. The screen display indicates your heart rate and your "target zone," the maximum and minimum heart rate for the most efficient training.

Once you've warmed up with the standard workout, it's time to go racing. From the main menu you select a match race with a phantom opponent or a previous workout, or you



When used with the optional heart-rate monitor, the *Dynalink* software displays a "target" zone. For the most efficient workout, you should keep within this zone.

can go up against a live opponent on another trainer.

When you race against the phantom, you set your opponent's time and distance, and the screen tells you the time you'll have to beat. During the race, your speed, miles covered, and miles remaining are displayed.

The *Dynalink* program lacks the spiffy graphics of *RacerMate*, but it costs a lot less—\$139.95 for the basic set-up and \$200 with the heart monitor. And these days you can pick up a wind trainer for less than \$50 on sale. *Dynalink* is a fun and inexpensive way to get a great workout.

List Price: *RacerMate Challenge*, Computrainer, and cable, \$750.

Requires: 256K RAM, one disk drive, graphics display adapter, serial port, DOS 2.1 or later. Not copy protected. RacerMate, 3016 NE Blakely St., Seattle, WA 98105; (800) 522-3610.

CIRCLE 661 ON READER SERVICE CARD

List Price: *Dynalink*, \$139.95; with optional heart monitor, \$199.95. **Requires:** Bicycle trainer, 256K RAM, one disk drive, DOS 2.0 or later. Not copy protected. Calladine Corp., 26111 Brush Ave., #115, Cleveland, OH 44132; (216) 261-5100.

CIRCLE 660 ON READER SERVICE CARD

AFTER HOURS INDEX

Chilling Down and Mellowing Out

Two relaxation programs to help you deal with the effects of stress

Diet Right

Diet Analyzer and Nutrition Wizard make it easy to watch what you eat

Willow

The big-screen movie: now available in game form on floppy disks

Reach for the Stars

Building a galactic empire through strategic plans

RacerMate keeps track of the distance between you and your opponent once you begin the race. Your opponent can be a computer-supplied "pacer," shown at left.



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